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THE U. T. FARMER

SOUDAN GRASS ON TENNESSEE STATION FARM
IN A DRY SEASON

Vol. X OCTOBER, 1915 No. 1

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Contents

The Silage Crop at the Station Farm ---------- 3
T. Hackworth, '17

The Milking Machine ---------- 5
F. G. Vickers

Fall and Winter Vegetables ---------- 6
I. T. Elrod, '16

The Relation of Bacteria to Soil Fertility ---------- 10
S. G. Abernathy, '16

The 1915 Peach Crop at the University Farm ---------- 11
J. O. Tacket, '15

Erosion and Methods of Preventing It ---------- 12
Robert Dudley Boyers, '16

Management of the Bull ---------- 13
C. A. Hutton

A Small Flock of Sheep ---------- 14
R. M. Murphy

Construction of a Wooden Hoop Silo ---------- 14
Frank S. Harkleroad

The Condition of Our Farms ---------- 18
W. H. Henry, '15

Liming ---------- 19
Jas. L. Robinson, '15

Field Observations ---------- 21
E. F. Arnold, '16

The Value of Farmyard Manure in Crop Production ---------- 22
L. G. Sebralla

Editorial ---------- 24

News ---------- 27

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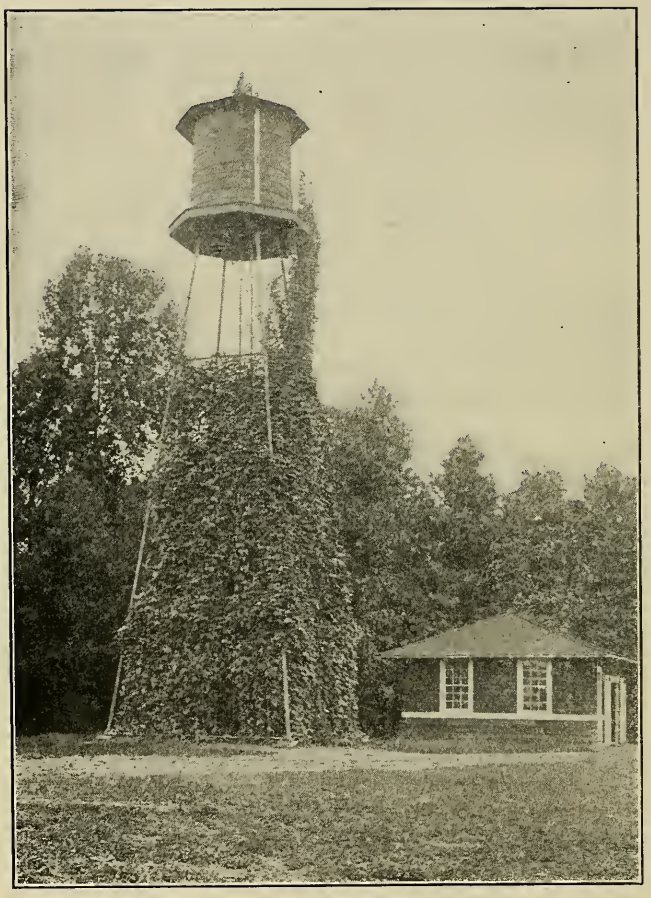

SCENE ON WEST TENNESSEE STATION FARM

THE U. T. FARMER

Vol. X | OCTOBER, 1915 | No. 1

THE SILAGE CROP AT THE STATION FARM

T. Hackworth, '17

At this season everyone has his eyes turned toward the silage crops, and is studying whether the yield will be sufficient for the herd, or the herd large enough for the yield. No matter what the figures on the present crop show, the question still remains, could a greater yield have been made on this same area without extra labor if a different rate or combination of seeding had been employed?

For the last three years, the East Tennessee Experiment Station has been carrying on valuable tests along this line. Eight one-acre plots are used in these tests, and different rates and combinations of seeding are put on each plot. The purpose of these experiments is to determine which amount and combination of seed sown furnishes the best silage with the greatest yield.

For the present year these experimental silage crops occupy section 6. This section was in red clover and vetch last year and this past June had a hay crop removed. June 12-18, 1915, the land was broken with a subsoiler, after which the ground was thoroughly disked twice and the rough parts three times. June 24-25 the plots were laid out and seeded as follows:

Acre No. 1—
16 lbs. Corn
10 lbs. Sorghum
35 lbs. Cow Peas

Acre No. 2—
5 lbs. Corn
5 lbs. Sorghum
30 lbs. Cow Peas

Acre No. 3—
10 lbs. Corn
10 lbs. Sorghum
35 lbs. Soy Beans

Acre No. 4—
5 lbs. Corn
5 lbs. Sorghum
30 lbs. Soy Beans

Acre No. 5—
5½ lbs. Sorghum

Acre No. 6—
10 lbs. Sorghum

Acre No. 7—
10 lbs. Corn

Acre No. 8—
20 lbs. Corn

The first cultivation was given July 14; the second, July 24; and on August 9, it was stirred with a "Gee Whiz" cultivator. The crop has not yet been harvested, but considering the unfavorable weath-

er conditions which have prevailed, the crop is looking rather good, and the results will compare favorably with the results of the 1914 crop under the same experiments. The following yields were recorded from the 1914 crop:

Beans, thin, as in No. 4 above, 26,350 lbs.

Acre No. 5—Sorghum alone, as No. 5 above, thin, 29,100 lbs.

Acre No. 6—Sorghum alone, as No. 6 above, thick, 28,590 lbs.

SORGHUM AND COWPEAS FOR ENSILAGE ON TENNESSEE STATION FARM

Acre No. 1—Corn, Sorghum, and Peas, thick, as above, 27140 lbs.

Acre No. 2—Corn, Sorghum and Peas, thin, as in No. 2 above, 20,465 lbs.

Acre No. 3—Corn, Sorghum and Beans, thick, as in No. 3 above, 27,850 lbs.

Acre No. 4—Corn, Sorghum and

Acre No. 7—Corn alone, as No. 7 above, thin, 22,790 lbs.

Acre No. 8—Corn alone, as No. 8 above, thick, 23,285 lbs.

Figures are sometimes misleading. You will note that as the figures stand, Sorghum alone planted thin gave the greatest yield in pounds. Yet, let us keep

in mind the fact that a part of this weight of the sorghum was due to the large amount of water present in the sorghum at cutting time when it was weighed. So, the figures do not represent the ratio of food values produced in these crops. The figures show that corn, sorghum and beans come second in the amount of yield. While the sorghum alone is low in protein; beans, which are high in protein help to raise the protein content of the corn-sorghum-bean ensilage. In fact, this combination is recommended for ensilage crops in sections where the climatic and soil conditions will enable the beans to get high enough to be cut with the corn binder. To be cut successfully they must reach the upper chain, otherwise they will cause much trouble. Where the beans grow low, peas are recommended as a substitute in the same combination as the beans, and will yield about the same grade of silage. It is true the differences in yield resulting from the different rates and combinations of seeding appear slight, but on the whole, the yield in pounds is somewhat in favor of the heavy seeding. The quality of the ensilage certainly is in favor of the combination of sorghum, corn, beans, or peas rather than corn and sorghum or either of these alone.

THE MILKING MACHINE

F. G. Vickers

The scarcity and high cost of labor together with the dislike that farm laborers have for milking by hand, have led to the invention and improvement of a machine that successfully draws the milk from the cows' udder. This machine not only makes milking easier work, but enables one to milk quicker. Where it has been tested, four to six cows were milked in the same time required to milk one by hand. At the Wisconsin Experiment Station it took about three minutes per cow on an average. In addition to this time it took from ten to twenty minutes to get the machine ready, and about twenty minutes to clean the machine after milking.

According to the amount of information available at present the machine will, with few exceptions, milk reasonably clean. If changed suddenly from hand milking to machine milking, a cow will decrease about as much as she would if a change in milkers by hand is made. Statistics show that the loss will amount to about one pound per day for the first week, and between four and five pounds for the next three weeks. Good results are not obtained, however, without stripping after the machine. This is absolutely necessary to get the maximum flow and to prevent early drying up of the cow. The strippings vary in amount with different individuals. In any case, it is larger at first. It generally decreases for

about two months, after which time, it ranges from one to three pounds per week.

The machine removes the milk by means of a vacuum produced by a suction pump. This was at first thought by some to have an undesirable effect on the udder, but later investigations have proven that this is not true with healthy cows. Occasionally when the udder is inflamed the machine has a tendency to aggravate it; but in one case in the Wisconsin herd, a cow's udder was cured of producing lumpy milk.

The Wisconsin Station made investigations regarding the success of the machine in the hands of farmers. Out of forty-one farmers, twenty-seven reported the machine to be a success. A few were undecided and a small number failed. The percentages were: 67% succeeded, 19% undecided, 14% failed. This shows that two out of three proved successful.

The expense is one of the greatest factors considered by farmers. It costs about $500 to install a machine. Repairs and expense of power will come in addition to this. The power will cost at least ten cents per day. The repairs will vary with the size of the dairy, probably with $25 per year as a minimum. The expenses prevents it from being at all practical with less than thirty cows.

The hose and teat cups afford excellent places for the development of bacteria. If the parts are not thoroughly cleaned, before and after milking, the milk will contain several times as many bacteria as hand drawn milk. If proper care is taken, the milk can be drawn without exposure to the dust of the barn, and will contain less bacteria than hand drawn milk.

The only way to prevent bacteria from developing in the machine is to scrub all the parts, steam them for 20 minutes and immerse in lime water. This keeps the machine clean so that milk drawn with it contains less bacteria than hand drawn milk. The B. L. K. Company recommend keeping the hose and teat-cups immersed in lime water when not in use.

FALL AND WINTER VEGETABLES

I. T. Elrod, '16

Perhaps, a well kept vegetable garden does more to supply the needs of the home than any other source of farm production. The land and labor employed give a greater return on the investment than any other like expenditure yields. One-half acre, if properly managed, will supply the average family. The returns from a good vegetable garden are from ten to fifteen times as great as those from general farm crops.

Most every farm home and many village homes grow their own vegetables during a short season of the year, but very few of the best gardeners provide fresh vegetables for the fall and winter months. From the standpoint of

health and food supply, it is as necessary to have fresh vegetables in the fall and winter as during any other season of the year. Better health and cheaper living are the results of a well managed garden. Investigations have shown that many of the salts necessary for the human system are obtained from vegetables and fruits, and where plenty of succulent foods are used in the winter diet, less tonics and fewer doctor's bills are needed. So, a good vegetable garden not only saves the purse, but also adds to the health and vigor of the family, which is of greater importance than the money value.

The home garden should be so planned and managed that the table would be supplied with fresh vegetables during the entire year. To succeed in working out a system of this kind, the gardener must select his location with care, and equip himself with a number of hot beds and cold frames in order to meet the fall and winter conditions. Fall and winter vegetables can be grown very successfully on most types of soil; but the best results are obtained from a well drained sandy loam soil rich in organic matter, and having a southern or a southeastern exposure. The seed-beds should be in a finely pulverized condition when the seeds are planted.

TRANSPLANTING FROM HOT-BED

Stable manure is the only fertilizer needed, but if this is not at hand, then, only the best grade of commercial fertilizer should be used, along with such green manure crops as crimson clover, rye, vetch, etc. Hot beds and cold frames should receive the first consideration in fall and winter vegetable growing. No gardener

can succeed without them. These can be built at leisure times with very little cost. The accompaning cut and suggestions may be helpful in constructing hot beds.

The location should be convenient to an abundant water supply, and should have protection from the cold winds by artificial or natural barriers.

The heat for the hot beds is furnished by the fermentation of fresh stable manure placed in pits. The pits are from ten to twenty-five inches deep, depending upon the climatic condition, six feet wide, and as long as is needed. This pit is filled almost full with fresh stable manure, mixed with forest leaves or some other form of organic matter in the ratio of two parts manure to one part litter. This should be well mixed, and then covered with four or five inches of sandy loam. While mixing, the bed should be thoroughly packed, and then allowed to stand three or four days before seeding, in order that it may pass through the process of violent heating from fermentation. The bed is enclosed in a frame made of lumber, brick, or concrete. One side of the frame is lower than the other in order to permit the water to run off. The beds may be covered with glass in frames as shown in the above diagram, or it may be covered with thick cloth. The cold frames are constructed in a manner very similar to that of the hot beds, but no stable manure is used. Cold frames are used for starting the more hardy vegetables, and for hardening those from the hot bed.

Fall and winter vegetables cannot constitute a complete system of gardening, but this is the part that is most commonly neglected. A brief discussion of a few of the most common fall and winter vegetables may, perhaps, aid in establishing a garden which will supply vegetables the entire year.

Spinach

The importance of spinach for greens is second only to cabbage. Under most southern conditions, spinach is not injured by cold weather. It grows best in damp soils containing plenty of nitrogen; even in rich soil, a light application of nitrate of soda will greatly hasten the growth and maturity of the crop.

The seed should be sown during the month of October in order that the plants may become well established before cold weather comes. Sow in rows one foot apart, at the rate of one ounce of seed to a row 100 feet in length. Spinach matures in about 40 to 50 days from date of seeding. The plants should be thinned from 4 to 6 inches in the row. Frequent cultivations, throughout the growing season are necessary to give the best growth. During the winter, it is necessary to mulch with straw or stable manure in the cooler sections of the South. This vegetable is grown at a time when it does not interfere with the growing of other vegetables, and is very profitable to market gardeners; it is well adapted to the home garden and adds another wholesome article to the home diet.

Celery

Celery is a comparatively new vegetable to us; yet, it has become so popular in the United States that thousands of acres are grown annually. The cool, moist climatic conditions of northern summer and southern winter are well suited for the growing of celery. Warm days and cool nights make the stems crisp and delicious. Any rich, well drained soil will grow celery, but mucky soils are best. Stable manure, at the rate of 25 to 50 tons per acre, is sufficient fertilizer. For late crops of celery, the seed should be sown in May or June, and the seed bed kept moist until the plants are started. Celery will mature in about 130 days from date of seeding.

The plants are very much stronger if they are transplanted before they are set in the open garden. If blanching is done by the use of soil, the plants should be set in rows 3½ to 5 feet wide, and 6 inches in the row; if boards are used, 30 inches is sufficient width for the rows.

Cultivation should begin as soon as the plants will permit. As celery has a very shallow root system, the tillage should never be deep. If a good mulch of straw or stable manure is used, no cultivation is needed. For the best quality of celery, blanching is very essential. This is done either by ridging with soil, or by shading with boards. Shading destroys the green coloring matter in the stalks. Soil blanching gives a better flavored celery, but it is cheaper to blanch by setting boards edgewise close to each side of the row. Celery can be kept very easily through the winter season by storing in cool moist cellars, or, it may be ridged with dirt and the tops covered with coarse litter, and then covered with 3 to 4 inches of stable manure. No home garden is complete withuot celery.

Lettuce

Lettuce is the most important salad crop grown in the United States and Canada. It is a cool-season vegetable, and, during the winter season, is forced in hot beds and cold frames on a large scale. The returns often reach $1000.00 per acre; though $500.00 is a good average return. Lettuce grows best in a rich, sandy loam soil in which there is an abundance of organic matter. Stable manure is the best form of fertilizer, since it supplies organic matter as well as food supplies. The excessive vegetative growth of lettuce draws heavily upon the nitrogen element of the soil. Therefore, a light application of nitrate of soda during the growing season hastens the growth, and makes a more crisp and better lettuce.

The greater part of the winter grown lettuce is forced in green houses and hot beds. Large quantities, however, are grown in the open under southern conditions. The time required for lettuce to mature from date of seeding is about 75 days. If sown about Sept. 1st, the lettuce will be ready for use in December. For early spring crop, sow the seed in hot beds in late fall and trans-

plant to flats in which they are carried through the winter, and as soon as the weather will permit transplant into the open garden. The plants should be cultivated frequently, but shallow, in order to maintain the moisture, and hasten growth.

Turnips

The most important fall and winter root-crop is turnips. This crop will mature in 6 to 8 weeks from date of seeding. The seed should be sown broadcast and covered shallow in a well prepared moist seed bed, during the month of August. Turnips are well adapted to cool conditions and will remain in the ground, without injury until freezing weather. A rich moist sandy loam soil gives the best results for this crop. Turnips do not require very much work, and are grown as a catch crop at a time when the gardener is not crowded for space in his garden. They may be easily stored by placing them in out-door pits and covering with straw and earth.

Other Vegetables

There are other important cool-season vegetables of which space will not permit a discussion:

Onions, mustard, radish, carrots, parsley, peas, parsnips, beets, cauliflower, garden cress, and kale.

For a full discussion of vegetables, the following references are given:

U. S. Department of Agriculture, Washington, D. C., Bulletin numbers 61, 232, 255, 282, 642, and 647. The College of Agriculture, Ithaca, New York. The Cornell Reading Courses, Vol. 2, No. 34, and Vol. 3, No. 58.

THE RELATION OF BACTERIA TO SOIL FERTILITY

S. G. Abernathy, '16

The question of soil fertility is very largely one for bacteriologists to settle; for bacteria play a very important and vital part in soil building as well as in soil depletion. With a thorough understanding of the nitrifying and denitrifying organism, the question of the maintenance of soil fertility may be settled with increasing yields probably resulting from our various crops. Under the heading Prototrophic bacteria are found the nitrifying, the iron, the sulphur and the nitrogen-fixing organisms. The first and last forms here mentioned pertain directly to soil fertility.

The nitrifying bacteria convert the ammonia formed by saphrogenic and saprophilic bacteria, in breaking down organic matter, into nitrites and nitrates. There are two different classes of these organisms: (1) Nitraso-bacteria, which change ammonia to nitrites; (2) Nitrifying-bacteria proper, which change nitrites to nitrates. The former of these changes the ammonia to a nitrous ferment $2NH_3+6O=2HNO_3+2H_2O$. The latter of these changes the nitrous ferment, or nitrite, into a nitric ferment or a nitrate, thus: $2HNO_2+2O=2HNO_3$. Both of these processes are oxydizing processes,

and the presence of acids interferes sadly with these changes. So, bases much be supplied to join with the acids and form salts to encourage the bacterial activities. These bacteria are widely scattered in the soils and are represented by several species.

The nitrogen-fixing bacteria are bacilli forms which live in the roots of certain classes of plants called legumes, and cause there the formation of nodules. There are varying forms for different plants, but these all seem to have some points in common. One of these common characteristics is the tendency to assume irregular forms at certain stages in their life history. They also possess in common the power of gathering nitrogen from the air and fixing it in a form available for use by the plant. These different forms represent variations of the Bacillus radicacola.

There are also free-living soil bacteria which take up nitrogen from the air. Of these, a spore-bearing soil bacilli (clastrida), with proper food present, can fix some nitrogen from the air. The most important of these free-living soil bacteria are the aerobic bacteria known as Azota-bacter. From the oxidation of corbohydrates, these secure energy for nitrogen fixation.

Different organisms are also employed in breaking down the highly complex nitrogenous and corbohydrate compounds into simpler forms ready for rebuilding into other complex compounds. The process of breaking down the nitrogen compounds has been termed ammonification. The molecule of protein is first broken up into proteoses; then into peptones; next, into polypeptids and animo acids; and these pass into ammonia. The waste product of urea is converted into ammonia corbonate.

Other organisms are also found in the soil which break up the nitrates into nitrites, and then the nitrites into ammonia and thus allow it to escape into the air as free nitrogen. Extensive and careful experiments have been made and are still in progress at the University and the Station to determine the exact relation these various soil-bacteria bear to soil fertility. Much has been found out about these minute organisms and their work. These experiments are still being carried on here and elsewhere, and the ultimate outcome, no doubt, will be of much interest and profit to the farming interests of the world.

THE 1915 PEACH CROP AT THE UNIVERSITY FARM

J. O. Tacket, '15

This year the peach orchard at the Fruit Farm bore its third consecutive crop. Although the quality of the fruit did not compare favorably with the standard, yet the yield equalled that of any previous year. The poor quality was due, in part, to the large rainfalls which came during the growing season.

The peaches were picked carefully in small baskets, and handled only one time before marketing. They were placed in 3-2, 2-2, 3-3. and 2-1 packs. The packs, of course, were made in accordance with the size of the peaches. The peaches that had been gathered the evening before were sold the next morning. Those peaches which had dropped upon the ground in picking, or had been blown off the trees by winds were not sent to market. All the varieties were sprayed twice, and some were sprayed four times. There was a guarantee that the pack should be a standard one and that the fruit should not be wormy.

All of the peaches were sold upon the Knoxville market and brought from one-fourth to one-third more in prices than the other peaches marketed here.

The Carman was the best seller of the varieties which were marketed, while the Champion, which is very similar to the Carman. was second in commercial value. The Greensboro, Bell of Georgia, Telliston were valued in the order named. The Carman and Champion were highly colored and of an unusual size as representatives of their varieties, and mainly for these reasons brought the best prices.

The results obtained from the orchard show the increasing need of directing our attention toward getting a better color on our fruit, also, the value of spraying and careful handling.

EROSION AND METHODS OF PREVENTING IT

Robert Dudley Boyers, '16

If you have ever stood in a forest during a hard rain I suppose you have noticed the water disappear as soon as it reaches the ground. Of course this is due to the fact that a litter is formed on the surface by leaves and other decaying organic matter, and that this litter breaks the force of the water and enables it to pass on down into the soil beneath almost as fast as it falls. Go with me for a moment to an open field where we have nothing on top of the soil to check the impact of the raindrops. These drops beat like several thousand little hammers upon the unprotected soil. The loosened particles are seen to flow away down the muddy rivulets. Can you imagine how many tons of rich soil we are losing each year by erosion alone? Since it is by the erosive process that we are losing most of our soil, and since this erosion is greater during winter than any other season, would it not be well for us to consider the means of taking care of our soils during the winter months?

There are several ways to prevent erosion and at the same time improve the soil. First, let us consider the cover crops. If we sow crimson clover, rye, barley, etc., we have a blanket which protects the soil from both the rain

impact and the erosion. This cover crop also makes the soil more porous and enables it to take up the water more readily. Secondly, by incorporating organic matter into the soil, erosion is much lessened. This holds up the soil and also enables the water to pass into it rather than run off on the surface. This organic matter in the form of humus later acts as a store-house for moisture when water is wanting. Again, in this organic matter you are adding more or less of the essential elements of plant food.

If the land under consideration be hilly it should be terraced. By this terracing we can largely control the washing of our hillsides. The drainage is sometimes profitably employed on these hillsides where the location is almost ideal and the land is sufficiently valuable in productivity to justify it. This might be employed successfully where intensive trucking is carried on. Orchards are often put on these hillsides and when sown to cover crops in winter and properly cared for during the growing seasons, it seems that putting these slopes to orchards is a profitable way to handle them. Lastly, the problems of erosion must be studied and solved in relation to all the other problems of the soil and crops. You cannot isolate it and make it the all important subject of study. The same close thoughtful study that puts in a suitable rotation of crops, or cares for a herd of shorthorns successfully, or solves the other farm problems, can take care of the question of erosion. The only difficulty is in getting the mind sufficiently directed to this subject, and its importance fully understood.

MANAGEMENT OF THE BULL

C. A. Hutton

The ownership of the best bulls in the world would be disastrous to Tennessee farmers, if they persist in the present methods of the majority in handling them.

It is more often the rule than the exception to see creditable bulls running in pastures with from 25 to 100 females. Such practice can not be too harshly condemned. The results are too well known to be recorded; however, the tendency to end such a system is not evident.

Young bulls are ruined for breeding, really before they have a chance to show their worth, and older bulls are given an opportunity to show traits termed "rougishness" that end in their consignment to the block before their real period of usefulness is ended. There is no good reason why the service of a good bull can not be doubled or tripled over that usually obtained, by properly conserving his powers and using him in different herds or communities, when such is necessary to prevent inbreeding.

There is only one proper place for a bull and that is in a properly

constructed and arranged lot or paddock where there is water, shade, and room for exercise. Of course, pasture is desirable, but if it is necessary to feed the bull the year around, it will be a paying proposition when the usefulness of a really good bull is at stake.

Arrangements can easily be made to facilitate the introduction into the lot of females for breeding, by the placing of gates. Allow only one complete service, as experience has shown that it is as sure as a dozen.

If the bull is at all vicious, it is advisable to have a strong wire running overhead the length of his enclosure. On this wire place an iron ring, to which tie a wire or rope connecting with a ring in the bull's nose. By this method there is no interference with exercise, and it will not be necessary to unfasten the bull for service.

A SMALL FLOCK OF SHEEP

R. M. Murphy

There is more money to be made from a small flock of sheep judiciously handled than from any other kind of stock on the farm. They do not stand crowding, but on nearly every farm in the State there is room for a small flock. H. C. Lawler, of Martin, Tenn., is taking advantage of the sheep situation in the following manner. He furnishes the farmers of the surrounding community a small flock, assuming all loss from dogs or death from any cause for one-half the wool and lambs. For a number of years he has been increasing the number until he now has scattered through the country more than 500 ewes in flocks ranging from 25 to 50 in number generally. In the community where, up until he started this, not a sheep was to be found because of fear of dogs, etc., indications are now that in the course of the next few years every farmer will have a small flock. They have paid and paid well in this community because cotton has been low in price and the farmers have needed the money. Mr. Lawler makes 80% on his investment, which is more than he can make in many other legitimate ventures, and the farmer just simply finds his half, for he has an abundance of weeds and Japan clover going to waste. There is great opportunity for this plan to succeed in many other communities in the State.

CONSTRUCTION OF A WOODEN HOOP SILO

Frank S. Harkleroad

Since the awakening of the South to live stock production, we find silage playing a great part in the ration of feed; and on account of its economical importance, we should make well of its use. To

do this, we must have in our possession a good and well constructed silo.

In constructing a silo, give it plenty of height with not too much diameter. With plenty of height you get downward pressure of silage which means compaction, the expulsion of air and a less loss from moulding. The following table gives the height of silos needed for different diameters and capacities:

Height	Diameter	
20 ft.	10 ft.	26 tons
22 ft.	10 ft.	30 tons
22 ft.	12 ft.	43 tons
24 ft.	10 ft.	34 tons
24 ft.	12 ft.	49 tons
26 ft.	10 ft.	38 tons
26 ft.	12 ft.	55 tons
26 ft.	14 ft.	74 tons
28 ft.	12 ft.	61 tons
28 ft.	14 ft.	83 tons
30 ft.	14 ft.	93 tons
30 ft.	15 ft.	95 tons
30 ft.	16 ft.	119 tons
32 ft.	14 ft.	101 tons
32 ft.	15 ft.	105 tons
32 ft.	16 ft.	130 tons
32 ft.	17 ft.	148 tons
34 ft.	15 ft.	115 tons
34 ft.	16 ft.	143 tons
34 ft.	17 ft.	161 tons
34 ft.	18 ft.	181 tons
36 ft.	15 ft.	125 tons
36 ft.	16 ft.	151 tons
36 ft.	17 ft.	174 tons
36 ft.	18 ft.	196 tons

As soon as you have completed your plan, you should begin the foundation:

Foundation

Drive a strong stake in the center of the proposed silo. Saw off the stake at a height of the desired foundation wall. Spike one end of a straight 2x4 in. scantling to the top of the center stake. The scantling should be a little longer than is necessary to reach from the center of the silo to the outside of the foundation wall. The head of the spike marks the exact center of the silo. From this point measure on a scantling the distance both to the inside and the outside of the foundation wall. After marking these distances of the width of the wall, nail on to the scantling a marker and revolve the scantling on a center peg. The scantling must be kept level while it is being revolved. If the ground is sloping, have a marker that can be adjusted to any height of scantling. The thickness of the foundation wall should vary from 10 to 18 inches, depending on the size of the silo. The inside foundation wall should be three inches nearer the center of the silo than are the inside staves.

The foundation should be made from the best material, and that is concrete. The earth between the two marker lines should be removed until firm ground is reached. The concrete should be a 1:2:4 compound—that is, one part cement, 2 parts sand, and 4 parts stone. Mix the cement and sand thoroughly and then add water. Make this into mortar, such that it will not cling to the shovel or turning hoe. Measure up broken stones, wash them, and then add them to this mixture. The final mixture should be turned several times until the contents are thoroughly mixed. The concrete is now ready for use.

Place the concrete in the trench and tramp in until water appears on the surface. It should be tramped in layers of 8 inches thickness. See that no fallen dirt accumulates on top of the concrete which might interfere with its adhesion. After the trench or ditch is filled to the surface of the ground, drive 2x4 inch stakes ½ inch from the foundation wall, on both the inside and outside. These stakes should be 2 ft. apart and driven all the way around the foundation. They should be adjusted with a straight edge, then cut off to the height of the foundation wall.

Take green lumber ½ inch thick by 6 inches wide and nail these boards to the stakes with the top edge at the marks. At several places nail slats across the top of the form to keep the inner and outer circle of the form the proper distance apart. Fill the form, and if it is to be very high, reinforce the concrete with iron bars and fencing wire. It would be well to place from 4 to 6 eye bolts ½ inch in diameter and from 20 to 24 inches long in the formation. The bolts should extend from 8 to 10 inches above the top of the wall, and 6 inches from the inner side. They should be in a vertical position; and when the silo is finished, the staves adjoining the bolts should be securely fastened to them. When the concrete is finished to within one inch of the top, finish the wall with mortar made by mixing one part cement to 3 parts sand. Strike this off level with the top edge of the form.

After the concrete has set, make a line with a nail on top of the foundation wall 3 in. from the inner edge to show where the inside edges of the staves will come. Next, dig out the dirt inside the foundation to 4 in. depth or to the bottom of the foundation wall. The concrete floor should be 4 in. thick and made of martar similar to that used in the foundation walls. The surface should be finished with mortar, 3 parts sand to 1 part cement.

Lumber and Construction

The best materials for the construction of a silo are: cypress, hard pine, and long-leaf pine. It is important that staves should be straight, free from sap wood, and loose knots and wavy-edges. Staves should be made of 2x4 in. material. The lumber should be surfaced four sides, or two edges and one side. By all means, the edge and ends should be square. After the staves have been properly finished, holes should be bored in the edges 4 to 6 ft. apart with a ½ in. bit. Holes are made on only one edge of each stave, and should not be in line with those of adjacent staves. Holes need to be 1 in. deep in staves 2x4 in. and 3 in. deep in staves 2x6 in. The holes should be perpendicular to the edges of the staves. These holes are for the purpose of spiking the staves together.

It is preferable that all staves be in one length; but where this is impossible, they should be of two pieces of different lengths, and when setting up let the lengths alternate. The two lengths should be spliced together by making, in the ends to be joined, a saw cut,

and inserting in this cut a sheet-iron splice.

The door of the silo should be laid off before the staves are set up. This may be done by saw-cuts about one-half through each stave to be used on one side of the doors. This cutting should be on the side to go next to the doors as an entrance for the saw, for cutting out the doors. When the staves are set up. These cuts for the doors should be at on angle of 45 degrees with the perpendicular to the walls, with the longer edge all around the door on the inside wall or surface. When the staves are being put up, the door-stave should be located at one side with the cut next to the door, and when the hoops are put on the silo insert the handsaw into the stave-cuts and saw out the door with the above slopes observed.

When putting up the staves, provide a good scaffold. The first stave should be placed with its inner surface in a line 3 inches from the inner edge of the foundation. This stave should be plumbed on one edge and one side, and firmly braced in all parts. The next stave is then set up and nailed to the first one with 30-40 penny spikes. The spikes are placed in prepared holes and driven home with a draft-pin. The other staves are put up in like manner.

Hoops should be ¾, ⅝ or ½ in. rods in sections 10 to 14 ft. long. The rods should be threaded for 6 in. at each end, so they may be joined by means of tugs. Two hoops should be placed below the first door, two between the doors all the way up, and two above the top door. When all hoops are on they should be drawn until all the staves are pressed together. The door should be 24 in. wide by 30 in. high. Two cleats 2x3 in. with one edge cut to circle the silo should be nailed and bolted on the outside of each door with the bolt heads on the outside.

Wooden Hoop Silo (Continued)

Starting with the same concrete foundation, a wooden hoop silo can be constructed at much less cost than any other kind. The material should be made from 1x4 inch hard pine ceiling. The lumber should be made from the best grade; and where it is necessary to use two lengths, they should be odd lengths, and should alternate. A form for the bending and construction of wooden hoops should be made of strong material. The diameter of the form should be equal to the diameter of desired hoop. Hoops should be made from ½x4 inch straight-grained green oak lumber. Hoops should be of four thicknesses and should be nailed together well. Hoops when finished should be spaced two and one half feet apart and then placed in a vertical position over the foundation. A good strong supported scaffold should be constructed in center of the silo.

Hoops when placed and well adjusted over foundation should be well braced, so they may not be jarred out of plumb when the ceiling is nailed on.

When hoops have been adjusted, nail on the ceiling. It is best to begin at the side where the door is to be formed. The first piece is nailed in a vertical position, and

the remaining ones likewise, until the round has been made within 2 feet of first stave. Where a continuous door is desired, you now have a 24 inch opening running the height of the silo. In this case, two cleats should be nailed in a vertical position on the inside of the silo. These should be on either side and about 2 inches from the edge of the door.

The door material should be made from broad lumber, and should be well jointed and tongued and grooved. Door-boards can be placed in position as the silage material fills in and approaches the top of silo.

Roof

Silage should be protected from the weather. Throw up rafters to the center of the silo making a cone-shaped roof. Next, shingle with some good material and have a trap door in the roof for the silage pipe.

THE CONDITION OF OUR FARMS

W. H. Henry, '15

While our farmers in East Tennessee are making some progress along the lines of stockraising and soil improvement, they are as yet very slow in taking hold of new methods of farming.

Our farms would, if farmed scientifically, produce one-third more than they are producing. Our farmers of East Tennessee, as well as of other sections, need to wake up, and put into practice what they know of the best methods, instead of dragging along in the tracks of their fore-fathers, who had new land most of the time and who did not have advantage of the improved machinery that we now have. Only now and then will a farmer risk a little money invested in a pure bred animal, a cover crop, a field of alfalfa or a silo. They all say it is too expensive, they can't afford it. If they would only let themselves believe that they would be making money instead of making a dead investment, they would do a great deal more. Most all farmers wait for the other fellow to try a thing first, then if it proves to be, without a doubt, a good thing they fall in line.

One day during April of last spring, while driving across the country in one of our East Tennessee Communities (on one of the best pikes in the State), I took notes on the condition of farms as I saw them from the buggy. During a ride of ten or twelve miles I counted only one hundred sheep, sixty-five head of cattle, including calves, and fifty hogs. The country is well watered and grows fine clover and grass when given a chance, thus making ideal conditions for stockraising. I, also, counted fifty dogs, one dog for every two sheep. I saw only three fields of about forty acres of red clover, and not a single field of alfalfa or of crimson clover. I saw about twenty fields, or about two hundred and fifty acres that did not have anything growing

on it at all. I saw about fifty acres of land that had been allowed to grow up in bushes and briers and to become full of gulleys; this land all lays well and could be made to produce good crops. I saw only three instances where wheat or other cover crops were being pastured. I saw a good many places where, from the looks of the barns and general surroundings, the farmers where well able to build silos, but I saw no silos.

The way to better existing conditions is to get up some enthusiasm along this line, and not wait for the other man to lead. We need more cover crops, more silos, more alfalfa and red clover, more stock, less dogs, more pure bred animals; and to sum it all up, we need better farming and better business.

LIMING

Jas. L. Robinson, '15

The practice of liming has been followed almost as far back as we have any record of agricultural processes; but it is only during comparatively recent years that the scientific reasons justifying the custom have been made known. With this knowledge of fundamental principles as a basis, the treatment of soils with lime has become much more general, and at the same time, the soil exhaustion which was observed to follow liming has been explained and methods worked out that prevent these evil effects.

Lime, on being applied to the soil, produces three effects: (a) physical, (b) chemical, (c) biological.

The physical effect of lime is to flocculate the soil particles. The lime particles gather about themselves the soil particles in little clusters. This is of most advantage in heavy, close soils, which it renders more pliable, and at the same time increases its water-holding capacity. These are not results that are seen at once, but ones which come after several years have passed and a number of applications of lime been made to the soil.

The chemical influence of lime is to neutralize the acidity of the soil, or even to make it slightly alkaline where a sufficiently heavy application has been made. The best way to test this is with neutral litmus paper, but as this cannot usually be found in a country town, dependence must be placed in testing with red and blue litmus. The soil to be tested is wet with rain or distilled water and placed on a piece of the blue litmus. If the paper is reddened the soil is acid. But in addition to correcting soil acidity, lime renders soluble other mineral elements which are plant foods.

But the greatest chemical effect is the indirect one, which it has on the flora of the soil. The larger number of the many kinds of bacteria require a slightly alkaline, or at least, a neutral, medium for

good growth, and this is true of the nitrogen gathering bacteria. The first of these, the azatobacter, lives in the soil and gathers nitrogen directly from the air. The other, the radicicola, lives on the roots of the different species of legume plants, and likewise gathers nitrogen from the air. In soils that have the proper reaction, these two agents of soil fertility can multiply and carry on their work of soil improvement unhindered; while if the soil is acid, this process is rendered much slower or even stopped altogether.

It is because of the cooperation of these minute organisms, the radicicola, that the legumes are often spoken of as nitrogen gathering plants; and on the growth of these plants we rest much of our scientific farm practice. The nitrogen gathered by the bacteria is taken into the compounds of the plant, and is then returned to the soil when the plant decays on the soil, or is returned to it after being fed to some animal. By this means the nitrogen supply in the soil is gradually increased. Because of the dependence of the plant on this organism, many of these legumes cannot be successfully grown unless the land is limed.

In actual farm practice in this State, it is generally found that alfalfa cannot be grown without lime. Usually, the same is true for red clover, alsike clover and white clover. Crimson clover, cow peas, and soy beans are much helped by lime; the increased yield, according to the observations of the Experiment Station, ranging from 25 to 100 per cent. Most grasses, corn, sorghum, wheat and barley are considerably helped by the addition of lime. Potatoes and tobacco are not much affected, while cotton, peanuts and watermelons are injured if they are planted immediately following the lime application; but if a legume is first planted and turned under, there is some increase, even in these.

The increase in the yield of legumes following liming is due; first to its biological effect on the bacterial growth in the soil; and secondly, to the fact that it renders phosphoric acid and potash more available to the plant. The increase in the non-legumes is due to the second factor only. This increased yield means a more rapid drain on all the plant food elements, and unless we combine feeding live stock, or green manuring with crop production, the use of lime means only a more rapid depletion of soil fertility. It takes this and judicious use of fertilizers to render false the old adge that "lime enriches the father and impoverishes the son."

The forms in which lime is usually applied to the soil are ground rock, burnt lime, and air-slacked lime. The amount needed per acre depends on the acidity of the soil; but for average Tennessee soils, two tons of ground rock, one ton burnt lime or one and one-third tons air-slacked lime will meet the requirements for five to ten years. It can be more evenly applied with a lime spreader; but unless a considerable area is to be limed, the outlay for the spreader will not be justified. It is best to spread on plowed land and then disk in, instead of turning under.

FIELD OBSERVATIONS

E. F. Arnold, '16

There was sown on Lime Rock Farm, two miles south of Winchester, two years ago, eight acres of alfalfa. The first year it proved to be the most disappointing field of alfalfa in that section. Early this spring 200 pounds of 16% acid phosphate per acre were added and in spite of the fact that fully one-half of the field has a poor stand the first three cuttings baled 19 tons. It is now ready to be cut the fifth time. Just a short distance away on land of the same character and receiving the same treatment with the exception of the application of 16% acid phosphate this spring the yield was only 11.2 tons, a difference of 7.8 tons in the first three cuttings. The cost of the acid phosphate applied was $13.60. One ton of hay would pay all expenses of this application of acid phosphate. Does it pay to feed alfalfa?

On the farm of Tom Roberson, near Winchester, a field of peas was sown. Half the field was treated with lime. Just before the peas began to bloom, those on the limed section were fully eight inches higher than those on the unlimed section. It would be conservative to estimate the increased yield at from one-fourth to one-third. Do you think his neighbors would question the value of lime for a legume crop?

While at home this summer, I visited every community in Franklin County. I have always felt that old Franklin was the garden spot of Tennessee, but my conception of her advanced position in progressive methods of agriculture was a miniature one. In every locality I found acre after acre buried beneath the wealthy foilage of cow peas, soy beans, red clover and alfalfa. Everywhere men were busy in the fields caring for their hay crop. In handling this hay they, however, clung to their old methods, and were going about tearing down and spreading out great fields of hay that had been cocked up, but insufficiently cured to be stored in the barns. This labor and a large percent of the damage to the hay could have been avoided by the use of simple curing frames that any one can make. Bulletin 82 "The Soy Bean, a Comparison With the Cow Pea," by Prof. C. A. Mooers, gives detailed use and structure of the curing frame. It will be sent free to anyone upon request.

The damage done to the corn crop this season by storms in Middle and West Tennessee has been very serious. The damage does not consist alone in preventing the full development of the ear; but in many instances the stover is lost and the ear itself is faulty. With a silo on the farm, this loss could be much lessened. The farmers who have silos have

been quick to take advantage of this situation and fill their silos with this blown down corn. It seems to us that the silo is not only a place for the storage of feed, but an insurance against the havoc so often wrought by storm and rain.

THE VALUE OF FARMYARD MANURE IN CROP PRODUCTION

L. G. Sebralla

The following results selected from a large number of articles showing similar conclusions, were chosen to show that the general effects of the application of manure are fairly constant, and are comparable in all countries. These statements are summaries of actual experiments and may be relied upon as being trust-worthy.

Ohio Bulletin No. 246

Manure is beneficial because of: (1) the plant-food and humus-forming organic matter which it contains; (2) the stimulating effect which it has upon bacterial development; (3) the alkaline nature of the ammonium, potassium, calcium, and magnesium corbonates formed during the process of its decomposition, which tends to neutralize soil acidity; (4) the improvement in the physical condition of the soil, resulting in an increased water-holding capacity; (5) the solvent action which it exerts upon certain constituents of the soil due to the gases liberated during the decomposition of the organic matter in the manure.

"Soils"—by Lyon and Fippin, Table LV, **Composition, Amount, and Value of Manures, Without Litter, From Different Animals:**

Kinds of Livestock	Percentage of Composition				Pounds Ingredients per Ton Manure			Value per Ton	Production per 1000 lbs. Live Weight	
	Water	Nitrogen	Phosphoric Acid	Potash	Nitrogen	Phosp. Acid	Potash		Pounds per Day	Value per Year
Horses	48.70	0.49	0.26	0.48	9.00	5.20	9.60	$2.21	48.8	$27.74
Cows	75.25	0.43	0.29	0.44	8.60	5.80	8.80	2.02	74.1	29.27
Calves	77.73	0.50	0.17	0.53	10.00	3.40	10.60	2.18	67.8	24.45
Swine	74.13	0.84	0.39	0.32	16.80	7.80	6.40	3.29	83.6	60.88
Sheep	59.52	0.77	----	0.59	15.40	7.60	11.80	3.30	34.1	26.09

These are the results of extensive experiments conducted at the Cornell University Experiment Station, with animals fed on common American feeds. In calculating the values of the manures produced by these animals, nitrogen is reckoned at 15 cents per pound, phosphoric acid at 6 cents, and potash at 4½ cents per pound.

In regard to the various amounts of the elements in the manure which are assimilated by the different crops, the following results are quoted from B. Schulze et al. (Arb. Dent. Loudw. Gezell., 1911, No. 198): Average amounts of the nitrogen from the manure, assimilated during the four years of the experiment, 23%. Of this 23% of nitrogen, 43% was assimilated during the first year; 27.8% during the second year; 16.6% during the third year; and 12.6% during the fourth year. Of the phosphoric acid, 33.4% was assimilated during the four years. Of this amount assimilated, 45.1% was taken in during the first year; 27.1% during the second year; 14.9% during the third year; and 12.9% during the fourth year. Of the potash, 48.8% was assimilated during the four years. 57% of the amount assimilated was taken in the first year; 15.5% the second year; 12.7% the third year; and 14.8% the fourth year.

These experiments were made at different places, with different kinds of soils, and with manures of varying composition. The crops grown included wheat, barley, oats, rye, leguminous plants, rape, flax, potatoes, and sugar beets.

Ohio Bulletin No. 246

The net returns from manures depend upon and varies according to the nature of the soil, the method of cultivation, and the character of the crop. The Ohio Station has obtained an increased yield amounting to $4.69 per ton from barn-yard manure used at the rate of 8 tons per acre in a five-year rotation of corn, oats, wheat, clover and timothy; 4 tons of this being applied to the corn, and 4 tons to the wheat. The average return from barn-yard manure, used in all tests in which rotation is practiced, has been $2.97 per ton.

County Northumberland, England, Bul. 16

In view of results of fertilizer experiments on meadows, pastures, and with various rotations, the author concludes "that dung is of considerably more value than artificial fertilizers for this light soil, but both give satisfactory results." The use of dung alone was followed by practically as heavy crops of roots as when artificial fertilizers alone were used; but the residual effect upon the three following crops was greater in the case of the mixture.

Walburn Field Experiments 1905-6

(Journal Royal Agricultural Society, Eng., No. 67).

Wheat growing experiments; barnyard manure giving the highest yields:

No manure, 14.25 bu. per acre.

Barnyard manure, 32.45 bu. per acre.

Commercial Fertilizers, 26.57 bu. per acre.

In barley growing experiments, barnyard manure excelled in both the quantity and quality yields of 1905 and 1906.

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EDITORIAL

This is the season for putting wheat into the ground. The Tennessee farmers have some difficult problems to confront in wheat raising. First, they must be careful not to sow too early lest the Hessian fly damage their crops; secondly, they must sow early enough to get a winter cover for their fields. In some sections of the State it is a practice to sow wheat after corn. Some who do this admit that it is a bad practice. Often the corn matures late and the wheat gets but little growth before the winter rains and freezes begin. This of itself is enough to condemn this method of cropping. But there is another reason which appeals just as strongly for a change. No intervening legume crop separates the two grain crops, and as a result the fertility of the soil is soon impaired unless much manure or fertilizer is used. Examples might be cited in some of the wheat fields on the pleateau slope of West Tennessee where the soil is very easily eroded. In one of these fields the corn matured late and the ground was disked down and put to wheat about the first of November. The following spring a regular network of gullies were seen covering this fertile field. More had been lost by the washing than the wheat crop was worth. This is not an isolated case. Such instances could be cited each year over a large section of the State. The same trouble is experienced in sowing winter oats. It seems that a slight change could be made in the rotation of corn, wheat and clover; and another year added with great advantage along the lines of larger yeilds and protection from erosion. Instead of waiting until the corn matures to put in the wheat, it could be sown with a middle-drill just after the

last plowing of the corn (August 1-15). Oats, barley, or perhaps best of all, crimson clover can be used very successfully. This field can be pastured during the winter. In the spring this cover crop could be turned under and the land put to beans, peas or both. Then after these are harvested, the wheat for cutting can be put in at the proper season. This four year rotation would be corn plus (wheat, oats, barley or crimson clover) for the first year; beans or peas or both followed by wheat in the fall, for the second year; wheat to cut, with clover sowed either with the wheat in February or even after the wheat is taken off. This would not leave the fields exposed and would, at the same time, alternate a grain crop with a legume crop.

The West Tennessee Farmers' Convention was held at Jackson in the new auditorium out at the State Experiment Farm, September 1st, 2nd and 3rd. This was the second meeting of the Convention in their new home, and proved to be the best one yet held in that section of the State. The farming interests of West Tennessee are becoming aroused to the great possibilities which lie before them, and are manifesting their new life by sending delegates from their various sections to represent those interests. The delegates were not disappointed at the reception and treatment accorded them; for they sat with rapt attention and listened to their problems discussed by such men as Governor Rye, President Peyton of the N. C. & St. L. Ry.; Dean Morgan of the University of Tennessee; Hon. H. K. Bryson, State Commissioner of Agriculture, Prof. C. A. Wilson and other instructors of the State University and speakers of note and practical experience along their respective lines. The attendance was good. Many farmers' wives were present representing the Home Making Department. Outside of the lecture room, much interest was manifested in the field excursions, in which men familiar with the Station Farm explained the various experiments that were being made on the crops there growing and being harvested. Considerable comment could be heard on the great changes which have taken place on the Farm since it has become a State Farm. From a tract of land mostly flat, cold, poor, and in places almost covered with craw-fish chimneys, it has been converted into a productive farm, orderly and artistically laid out into plots and fields. It is equipped with a house for the manager, with offices, and barns for the live stock, and a Convention hall erected by the farmers of West Tennessee for their meetings. All these improvements helped to impress the lessons of better farming and better living upon these visiting delegates. Another thing which seemed to interest the farmers very much was the live-stock of the Station. The horses and mules claimed a great share of this attention. Mules from the big Percheron mares were noted, not only for their size, but also for their suppleness and stamina. Instead of being the big sluggish overgrown

mules they expected to see, these farmers observed that they were of good form and type with plenty of vitality. The Holstein herd of dairy cattle also came in for a fair share of interest. Many other things might be mentioned, but enough has been said to indicate that West Tennessee is beginning to realize the importance of up-to-date scientific farming; and that it recognizes the University of Tennessee; the Experiment Stations with their forces, and their Annual Convention as potent factors in their movement for a broader, fuller and better life on the farm.

These are the busy days on the "hill" in the laboratories and at the Experiment Station. The University of Tennessee is still growing. From a small college high up on a hill one hundred and twenty-one years ago, it has grown until it now stands out as one of the leading educational institutions of the South. All the departments have been improved and enlarged; but the most noticeable progress is in the College of Agriculture. Only a few years ago the Agricultural Department was a very small one, and only a few students were pursuing this course. But Tennessee has awakened to a realization of her agricultural resources and possibilities. Time was when the boy from the farm who was mentioned as "one of the country's brightest young men" thought it was necessary to pursue a course in law, or medicine, or some similar profession in order to really amount to something. He and his parents, as well as the teacher who discovered his hidden talents, felt that his light would forever remain under a bushel, and that his superior gift would come to nought if he did not get away from the farm. But the old order of things is changing, and young men are beginning to see and grasp their opportunities on the farm and in agricultural work over the State. A large number of boys from our farms are finishing high school and coming to the State University for enrollment in the College of Agriculture. Some of the men who have finished are already holding important positions as county demonstrators and teachers of agriculture in high schools; while others are successfully putting their knowledge to practical use on the farm, making good financially and setting the example for better methods of agricultural practice in their respective communities. It is good to see the young men take this attitude toward education and their life work, and it cannot but mean bigger and better things for the agricultural interests of Tennessee. The College of Agriculture gladly welcomes the large number of new men, and accepts this as a good indication that the progressive farmers of the State are realizing and doing what is best for their sons in sending them here. May their number be increased as the years go by.

C. H. M.

NEWS

Messrs. E. M. Dement, C. L. Doughty, and Hugh Brinkley were seen on the "Hill" during the opening days. They are all members of the Class of '15. Messrs. Dement and Doughty are "farming it" while Mr. Brinkley is on his way to Cornell to take post graduate work.

Mr. R. E. Wilson of Class '15 is back in U. T. arranging to take a degree in agriculture.

Mr. C. C. Flannery, '15, is in Franklin County doing demonstration work. He is reported to be doing good work and meeting with a fair degree of success.

Mr. Forest Flemming, '14, who has for the past year been demonstrator for Marshall County, is very ill of Typhoid fever.

The College of Agriculture has matriculated the largest number of freshmen students this year it has ever matriculated at an opening. A great number of the former students are also back. So indications are good for a banner year for the Agricultural Department of U. T.

Prof. Wilson, Prof. Watson, and Mr. Dickmans attended the State Fair for a few days. They bring back the report that this is one of the best fairs yet held in Nashville. Some of the returning students were late matriculating on account of the Fair attractions.

Mr. Jesse Shaver, '15, has been elected to take charge of the Biology work in Peabody. Not wishing to leave all Knoxville behind, he secured the consent and wedded Miss Daisy Rule, one of the U. T.'s girls. Our very heartiest good wishes go with them to their new home.

The Farmers' Convention which was held at Jackson on the West Tennessee Station, September 1-3, was a great success. The display of live stock was better than usual. The Percherons given the Station by the N. C. & St. L. Railway attracted much attention. Pruning and other demonstrations in farm work were given; field excursions were made daily. The attending delegates went to get a lesson and showed unusual interest in all the proceedings.

Mr. James Robinson, '15, and Mr. Patrick Kerr, '15, are now located in Campbell County. Mr. Robinson is County demonstrator and Mr. Kerr is principal of the schools of LaFollette.

Mr. H. E. Baker, '15, now has charge of the creamery at the Station Farm.

Mr. W. J. Forbes, '15, is teaching in the high school at Hixon, Tenn.

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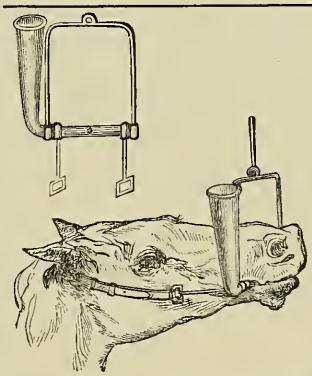

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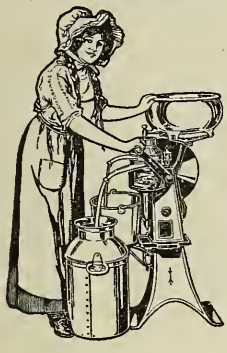

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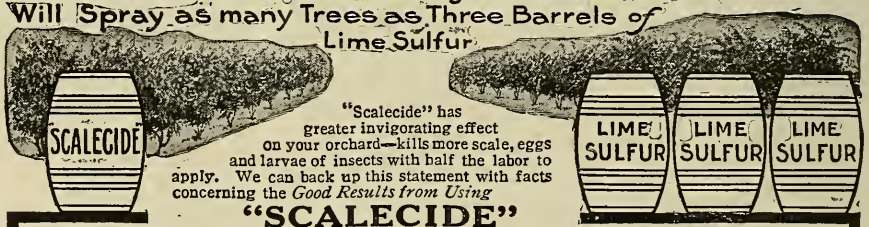

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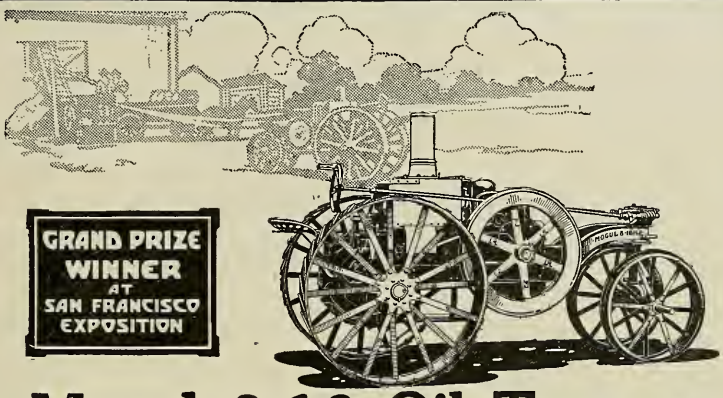

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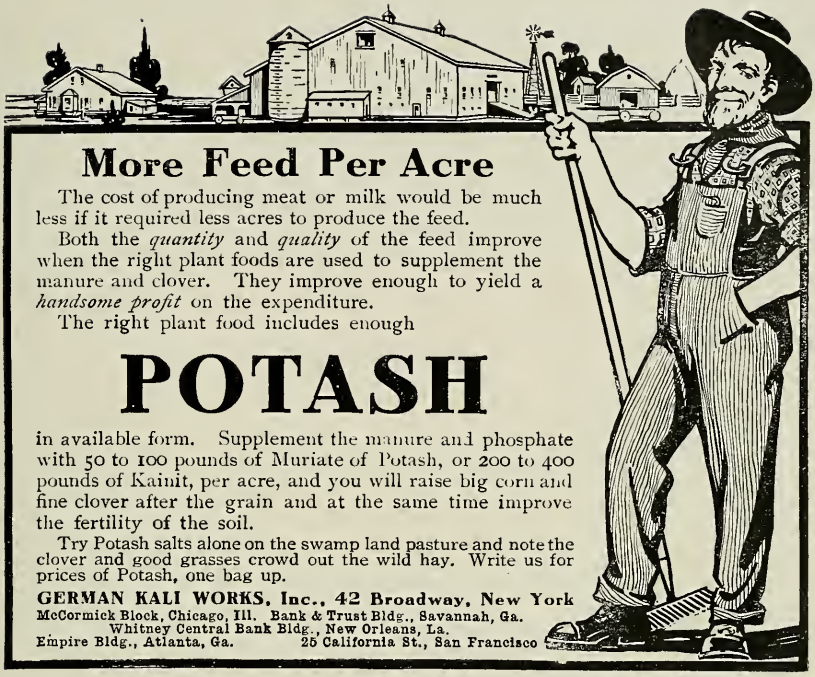

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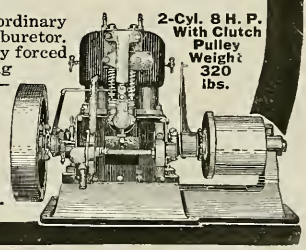

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Vol. X NOVEMBER, 1915 No. 2

Published Monthly By

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Contents

Page

The Selection and Care of Seed Corn ---------- 35
S. D. Beyer, '16

The Cover Crop ---------- 37
J. B. Baker, '16

Truck Farming in West Tennessee ---------- 39
M. E. Barker, Special

The Hog in the South ---------- 41
Russell E. Wilson, '16

Finishing Hogs for the Fall Market ---------- 43
Walter O. Sharp, '16

True Neighborliness ---------- 45
Mabel Wheatley, '16

Growing and Marketing Fruits and Vegetables ---------- 46
J. W. Lovell, '17

The Keeping and Storage of Sweet Potatoes ---------- 48
C. E. Johnson, '17

Length of Lactation Period, and Spring vs. Fall Freshening ---------- 50
W. A. Shadow, '17

Farm Practice in the Control of Field-Crop Insects ---------- 52
(Review of 1905 Year Book)
A. Jesse Winegar, '16

Marketing and Farm Credits ---------- 55
(From the National Conference)

News ---------- 56

Editorial ---------- 58

RUNNING THE DEEP TILLAGE MACHINE ON THE UNIVERSITY FARM

THE U. T. FARMER

Vol. X | NOVEMBER, 1915 | No. 2

THE SELECTION AND CARE OF SEED CORN

S. D. Beyer, '16

If we were about to select a mare or a cow for breeding purposes we would want to know something of the history of that animal. Similar attention should be given to the selection and breeding of corn.

Corn for seed should be selected from the field as soon as the husks turn yellow. Field selection is better because, when the selection is made from corn which is in the crib, we get good ears but we do not know whether those ears came from good, healthy, regular sized stalks. A frost will not injure the corn, so it is better to wait a short while than to gather the corn before the grains have matured. Then, too, the latter part of the growing season greatly improves the vitality of the corn. Select ears which are well formed, uniform in size, with medium length of shanks, and from stalks which are healthy, of medium height and have the ears about three or three and a half feet from the ground. Take the field by rows and gather the corn in a sack or large basket. Husk the corn and take it to the place where it is to be cured. At the time of gathering, corn contains about 25 per cent of water. This should be reduced to about 10 per cent before winter begins, because the rising and falling of temperature may cause the kernel to begin germination and its vitality would be lost.

There are various methods of drying and caring for the corn during the winter, depending somewhat upon the number of ears needed for seed. This can be regulated if the individual will keep in mind the following: dry the ears before freezing weather begins; store the ears in a dry, well ventilated place—not too close to the wall of the building or where the sun can shine directly upon the ears; keep the place at a constant temperature or as nearly so as possible and have the ears arranged so the air can pass all around them.

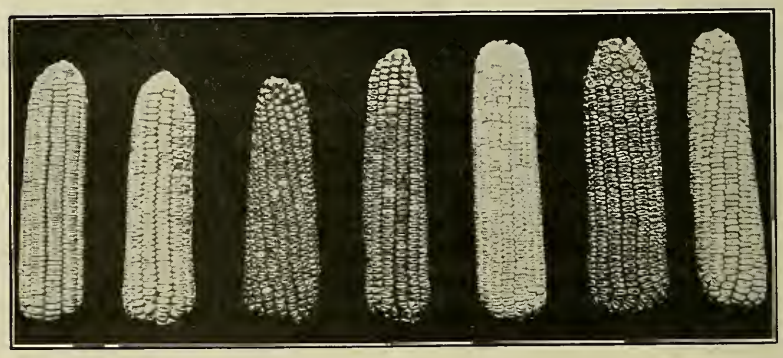
Just where to keep the corn during the winter can be determined by the individual, if he keeps the above factors in mind and the number of ears needed for seed. For small farmers the corn may be kept in the attic, since it is a dry place in the house; or near the kitchen stove; or in the furnace room. The ears may be suspended from the rafters by means of strings; placed in pigeon holed

shelves; or put on what is known as a corn tree. A post may be prepared with spikes sticking out and slightly upward. The ear may then be put in the spike with the large end next to the post.

Where more seed corn is needed, a house may be prepared for this purpose. The house should be built on concrete posts about two feet from the ground with inverted tin pans at the top of the posts to keep mice and rats from entering. Erect the building so it will be as nearly air-tight as possible, and use 2x4 planks for the floor. A place should be made for the stove. Windows which will open and shut, should be put in so the room can be ventilated.

The interior construction is largely a matter of choice. One can use the corn trees; corn posts may be placed about in the room; or the use of shelves is a good method. The shelves may be built so that the ears will rest horizontally or vertically. Keep the room slightly warm by means of a stove.

Before planting season a germination test should be made. Take a shallow box and divide it into small squares which are large enough for the germination of six grains. Take some saw dust which has been boiled to kill the bacteria and moulds, dampen it and place in the small squares. Number the squares and put six grains from each ear into one of the squares. Select the grains from different parts of the ear. Place the ears in relation to the germinating box so they can be detected as to which ones, if any, failed to germinate. The box should be kept at a temperature of about 50 degrees to 60 degrees F. until germination takes place. Check up the work and the corn is then ready to be planted.



SOME CAREFULLY SELECTED TYPES OF CORN

Experiments have shown that this work is practical. In some instances it has shown a gain over the selection-from-the-crib method by four or five bushels per acre. Then, a man growing fifty acres of corn increases his yield by at least two hundred bushel.

THE COVER CROP

J. B. Baker, '16

Very few farmers in Tennessee, or in the South in general, seem to know the value of the Winter Cover Crop. On most Southern farms except where small grain is grown, the land is left in the stubble of the summer crop and weeds until the next spring, or is plowed and left fallow through the winter months. The cover crop is practical in the South, and should be given a place on every acre of cultivated Southern land for the following reasons:

1st. Our Southern soil needs humus badly. The cover crop if turned under will add this humus.

2nd. Where a legume is used nitrogen is stored in the soil.

3rd. The growing crop prevents washing and blowing of soil.

4th. It prevents the leaching of important plant food elements.

5th. It makes available essential plant food elements for the main crop.

6th. It may afford some winter pasturage for light stock.

The cover crop as a humus supply: The greatest need of our southern soils is humus, the character of our soils and our climate allow decomposing bacteria to work rapidly, and unless a continual supply of humus is added through green crops or barn yard manure, the soil soon becomes depleted of this important constituent, namely organic matter. The soil then becomes hard to handle, holds less moisture, becomes low in available plant food, and consequently yields a poor crop.

Crimson clover used for a winter cover crop and turned under in the spring was found by the Deleware station to add as much humus as 5 to 10 tons of manure per acre. For keeping up the humus supply alone, where barnyard manure is not available in large quantities, the green manure crop has no equal.

Cover Crop as a Nitrogen Supply: The addition of large amounts of commercial nitrogen to field crops is not at all practical. For this reason we are forced to turn to legumes to supply out soils with this important plant-food element. A legume may be used as a cover crop to store this nitrogen during fall, winter and early spring months, while the soil is not being used for the main crop. This cover crop should not be turned under too soon in the spring, since most of the nitrogen gathered by the crop is done during the last stages of growth, just before full bloom. Yet the cover crop should be turned under in time to get the soil in good condition for the main crop. Crimson clover and vetch grow fast in fall and early spring, maturing early. These have been found to gather large supplies of nitrogen and can be plowed under early with good results. Red clover is slow maturing and for this reason cannot be highly recommended as a green manure crop, if a summer crop is to follow. The following data is taken from Deleware Station experiments showing amounts of

nitrogen gathered by various cover crops: where rye and vetch were used, being cut May 22, 165 lbs. of nitrogen was gathered per acre; Rye, alone, gave 24 lbs. of nitrogen stored per acre; Crimson clover cut May 20 gave 108 lbs. of nitrogen per acre by analysis; and red clover which was cut in June gave 115 lbs. of nitrogen. Later experiments gave crimson clover 165 lbs. of nitrogen per acre by analysis. Figuring the value of nitrogen at 20 cents per pound this amount would equal for rye and vetch, and for crimson clover $33.00 in value as a fertilizer. This amount is rather high but can be used as an illustration to show the value of green crops as fertilizers, especially as a nitrogen supply (rye of course does not gather any nitrogen from the air, so it does not really add any nitrogen to soil when plowed under).

Cover Crop Prevents Washing and Blowing of Soil: Many soils are easily washed by hard rains and the soil particles of some soils are blown off by hard winds. The green growing crop forms a blanket and prevents this loss by washing and blowing.

Cover Crop Prevents Leaching of Important Elements: A great amount of plant food elements is lost through leaching during the Fall and Winter, where there is no growing crop to use them. Experiments have shown that twelve times as much leaching takes place where no crop is grown as where a growing crop is kept on the land. This loss may mean much in the course of a few years if the land is left bare.

UTILIZING A WINTER COVER CROP

Cover Crops Make Available Plant Food Elements: There are large supplies of plant food elements in our soils that are not available at once. Most of our soils are rich in potash and fairly rich in phosphorous. The cover crop may be used to make these elements avail-

able for the main crop. That is, the cover crop gathers food for itself and when turned under in the spring soon decays and leaves the plant-food in an available form for the main crop to use it. Organic acid produced by decaying vegetable matter, also helps to make available some plant food.

Cover Crops for Winter Pasture: Cover crops may, also, furnish some pasturage through the winter and early spring for light stock, such as calves and hogs. Heavy stock should not be allowed to run on the field in winter, as they pack the soil and tear it up too much.

Other crops besides legumes may be used as cover crops, viz: rye, barley, wheat, winter oats, etc. These crops will give some pasture and prevent washing to some extent, but will not add much fertility to soil when turned under or much humus, and for this reason are not as valuable as the legumes. Sometimes best results can be obtained where a legume and one of these crops are grown together.

TRUCK FARMING IN WEST TENNESSEE

M. E. Barker, Special

If you are a born gambler and a scientific farmer you could succeed as a truck grower in West Tennessee. Truck farming calls for the most careful management of all the factors of production. It requires more than that, it requires the willingness to take a chance.

After the man the next most important factor is market. There are three kinds of truck markets: (1) the home market; (2) the shipping point, where one loads his produce on an express car and risks a merchant at the other end of the line to sell for him; (3) the selling point, where the commission merchants, through their representatives, buy directly from the farmers. Humboldt is the chief fruit market.

The real production of the crops must now occupy our attention. Everyone knows how to raise cabbage. About one year in three there is a little money in this crop, the other two years none at all.

Tomatoes and strawberries are the best paying crops. Gibson and Crockett Counties are especially adopted to these two crops. Of course there is land elsewhere that produces well.

For the production of strawberries a soil that is well drained, that warms up early, that does not puddle and is easily cultivated is needed. A slope that slants to the south is much to be preferred.

The cultivation of berries occupies a long season. The soil should be well broken and subsoiled in the fall. During the winter the soil should be ridged to facilitate surface drainage and early warming of the soil. About the first of March the plant bed is prepared and as soon as possible the plants are set. The berries are set thirty inches in the drill and the rows four feet apart.

The condition of plants and the mode of setting them are

very important. Good strong thrifty plants formed from the runners of the previous year are dug up and headed-out for a few days until the old roots are perfectly shaped for setting. New rootlets are put out and when the plants are put out in the field they are ready to grow right off. The dirt must be thoroughly packed around the roots. The work of setting out the plants reguires extreme care.

Cotton may be planted between the hills in every row or on every other row. A good crop of cotton may be secured at a slight additional cost. I have produced twenty-seven hundred pounds of cotton per acre this way and sesured a fine berry crop the next spring. The cotton stalks must be removed during the time the ground is frozen.

During harvest time a large additional force is required. For the picking, two cents per quart is paid. A good half-days work will account for seventy-five quarts. The picking season puts every man, woman and child in possession of a pocketfull of spending money.

When the farmer pays his crate bill, his picking hire, his packing line, he calls the rest of the proceeds "clear." An extra good crop of berries will clear a hundred and fifty dollars per acre. When all the operating expenses come out of this, it leaves about seventy-five dollars profit. If a cotton crop is grown the profits are materially larger. But the usual profits are far less than the figures mentioned. For instance, you have ten acres of berries some night that promises you a "Ford" for profit; next morning a frost has killed the whole thing and you don't need a ford, the river is dry.

Before you are through with the berry harvest the tomato suckers are growing very rapidly. As soon as the danger of frost is passed the tomato plants should be ready to be set in the field and the plant bed ready to receive them. To make these two conditions meet you must begin the year before. About fifty miles of furrows with the right kind of implements at the right time will get the soil of one acre in fair condition.

Tomatoes are sowed in the hot bed by the first of February, transplanted into another hot bed at a distance of two inches apart, and later into cold frames in dirt bonds which are four inches square. By the fifteenth of April these plants are ready to go to the field, and are worth a penny apiece.

Setting out the tomatoes is a laborious and expensive job. They are hauled to the field on a light wagon frame sixteen feet long. It takes two men to haul the tomatoes out, two to set the plants, one to distribute fertilizer and two boys and another man for odd jobs. This crew will set out about three thousand plants in a day.

The plants must be staked and then tied up about four or five times during the season. They have to be suckered each week for five weeks. Cultivation is carried on with the chain harrow (one horse), and five tooth cultivator. They are usually cultivated about fifteen times. A thousand pounds

of high grade fertilizer is used per acre.

About the fifteenth of June picking starts, and the active season lasts about six weeks. At the height of the season nearly a hundred car loads of tomatoes per day are shipped from Humboldt and the nearby shipping stations.

The profits of the tomato crop vary. It costs a hundred and fifty dollars per A. to raise a fair crop of tomatoes and put them on the market. The receipts will be three hundred dollars per A. for a fair crop. Many times it is higher. Many more times it is lower. Blight is now ruining the best tomato ground.

If any of the readers should wish to engage in the truck business in that section, remember it is a gamble, with hard work and much exposure connected with the work. It requires some capital, some science and much experience to make the truck farm pay.

THE HOG IN THE SOUTH

Russell E. Wilson, '16

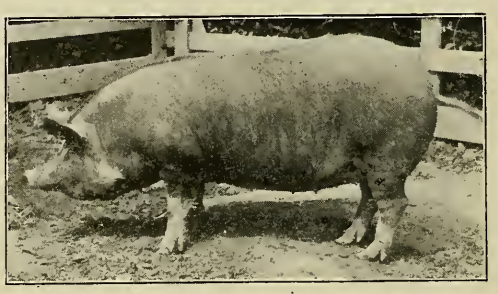
The early Spanish settlers of this Country brought over with them hogs. As time went on some of these animals escaped and found in the wild forest a natural habitat. From these sprang the renowned razorbacks of the past. They were able to obtain their food without the aid of man, living on roots, nuts and grasses which then grew luxuriantly. Where once was plenty of pasture are now found barren hillsides and plains which greet the eyes as we stop to view them.

The culture of cotton, allowing the land to remain bare all winter, has so facilitated washing and leaching of the soil during open winters, that much of the best land Nature ever gave to any people is now practically ruined. Much of the land has become so unfertile and the price of cotton so low, on account of too exclusive culture, that land owners cannot make day laborers' wages for themselves and families while growing it. Necessity is moving the people as never before to find new crops and new products to direct some of the labor and utilize the lands. A better balanced system of agriculture is needed—one that will include more crops to enrich rather than impoverish the lands; one that will include more live-stock to consume the products and make manure for enriching the soil.

At the present time the Southern people consume more pork than any other kind of meat, yet most of this is shipped here from other sections of the Country, thus sending away the money needed here at home. The hog can be grown as cheaply in the South as in any other part of the Nation, and there is no reason why it should not play a more prominent part in Southern Agriculture. When the South, as a hog producing section, is compared with the North, advantages favor the South. The Northern farmer

has to provide expensive houses to protect his animals from the cold; and while they are rooting in the snow for sprigs of grasses his more fortunate cousin may be grazing on winter cover crops. There is no season of the year when there cannot be plenty of green forage crops growing in the the South.

One can find reasons why this animal should be introduced more into our farming system. One of these reasons would be the effect it would have on the price of cotton. Instead of cotton being the only crop produced on the farm, why not have a few hogs to sell. By proper management the owner can have money coming in at different parts of the year, thus enabling him to hold his cotton after it is produced. Furthermore, only a small amount of money is required with which to begin a small hog business, and returns begin to come in early. The sales each year will soon be two to four times the amount of investment. The last reason, and one of the most important, is that the South is an ideal place for the production of hogs, especially the bacon type. Such a great variety of feeds can be grown, such as forage and grain crops. If we take the conditions as we find them and make use of them, we ought to, and can, produce pork more cheaply than it is possible to produce it in any other section. We do not need to feed corn alone when there are cheaper feeds that can be utilized and at the same time balance up the ration. The hog when allowed to gather his food is omniverous, eating roots, grass, nuts, snakes; in fact, no feed is known that he cannot make use of. Then why put him in a dry-lot pen and feed him grain alone? He does not enjoy prison life nor does he thrive so confined. Allow him to run on green pasture crops.



A GOOD PORKER

Why then has the farmer not made use of his opportunity? The answer is, that it has not been necessary. He has been contented to raise cotton, for which he always finds a quick cash sale. But the time for large profits on cotton has passed away. The sooner the farmer quits the one crop system and resorts to diversified farming, the sooner he will begin to prosper.

The question of a market for Southern stock will solve itself. Packing houses will be established

in the southern cities, and then there will be a profit to the small farmer and money to be made by the large farmer in the raising of hogs in the South.

FINISHING HOGS FOR THE FALL MARKET

Walter O. Sharp, '16

It is a well known fact that the hog is a great economic machine for producing food material for man, although often improperly fed and cared for. He is the best meat producer of our farm animals. Now, since the hog makes such a good response to treatment, even though poor, why should he not make better returns when receiving proper feed and care? Why should not hogs—as do other animals—appreciate the best possible adjustment of conditions and make a larger production when so treated? The kind of feeding carried on for hogs determine the profits of their yields no less than with any other farm animals. In fact, if fed properly, the hog will produce more for that food consumed than the sheep or the steer, and he will exceed any other animal in daily gain for his weight.

The common method of feeding corn alone to hogs does not result in as economical gaining as when balanced with other feeds. In fact, the corn-fed hogs are often fed at a loss. Many experiments show that hogs, when fed a balanced ration will yield more rapid gains and at a very much lower cost than the corn-fed hogs.

The market price for corn should be considered. The price of corn of late years has been so high it has become necessary that other feeds be partly substituted for it. The price of hog-feed is lowered considerably, and pork production becomes much more profitable, when a balanced ration is fed.

Hogs should approach the finishing period in the best possible condition. They should have been given such attention as would secure the most rapid growth and vigor. The careful farmer has very little difficulty in providing suitable crops for grazing through the summer, especially in the South. Such forage crops as clover, alfalfa, soy beans, cow peas, sorghum, etc., should put the hogs in excellent condition, when fed in addition, two or three ears of corn per head per day. It is claimed by some that it is impossible to profitably raise and finish hogs for market without pasture. Permanent pastures are kept at a small expense, and take the place of about one-half the grain fed to hogs. These pasture crops will establish plenty of frame, and the animals are usually put into the best possible condition to respond to the finishing process. Having been previously on pasture, good appetites are established, and larger gains should result.

Hogs may be fed either in the dry lot or in the field. But let us consider how much more practical it is to have them out in the open fields gathering their own feed. In

dry lot feeding, more bulk and variety must be added to the grain. If on pasture, hogs should be fed according to the quality of pasture, condition of animals, and the value of grain. It is found that in dry lot feeding, four to five pounds of grain are required to yield one pound of gain. This is costly production. Cheaper feeds can be had in forage, and better gains made when these crops are fed with the grain. The grain required to produce a pound of gain is much less when forage crops are used. The Missouri Experiment Station reports that hogs on forage require an average of 3.18 pounds of grain to yield 1 pound of gain, while those fed in dry lot require 5.11 pounds. This would be a saving of 38 percent in grains fed to those grazing on forage. They find that these hogs return $1.10 per bushel of corn fed, while those in dry lot return only 66 cents. Then the value of manure saved by each of these methods should be considered, the field method being much more profitable.

What feeds shall we use to balance the corn ration for hogs? Of course the availability and cost of each must be considered. Cotton-seed meal fed with corn in finishing hogs is largely used in the South. But many farmers refrain from its use because of deaths that often result. It is a dangerous feed for hogs if not used in moderation. If fed for a period of no more than 21 or 25 days it is found to produce no fatal results—even if fed in large amounts. And when fed with this good judgment, an excellent feed and ration is made with corn.

Tankage is also a very rich feed, and forms a good balanced ration with corn. It is not so dangerous as is cotton-seed meal, but it is a more expensive feed. They have about the same feeding value, pound for pound. Tankage may be fed to hogs at the rate of about one-fourth of a pound per day per 200 pound hog. 1 pound of tankage will save about 3 pounds of corn.

Soy beans or cow peas may be used in most cases as an economical feed for hogs. The method of allowing them to "hog off" crops, such as corn and cowpeas, has given satisfactory results. When this is possible, by harvesting their own feed in this manner, hogs have been found to give quicker and more economical results, and a splendid ration is afforded. These legumes are very important feeds for hogs.

Mixtures of corn and barley, or corn and wheat, are better than corn fed alone. With these grains added to the corn a better ration is supplied, and a better variety of feed is furnished.

Following are some balanced rations suitable for the average case in finishing hogs:

I.

6 parts Corn
1 part Cotton-seed Meal

II.

2 parts Corn
1 part Barley
1 part Wheat

III.

4 parts Corn
2 parts Barley
1 part Cotton-seed Meal

IV.

12 parts Corn
1 part Tankage

V.

7 parts Corn
1 part Soy Beans or Cow Peas

These rations are planned with a view of producing the most profitable and the maximum amount of pork. Some are not as good as others, as indicated before in this article. But they are given as good practical rations which may be used according to the farmer's needs and feeds. The necessity of forage plants as feeds in connection with grain cannot be too much emphasized for pork production. If such feeding is carried out as is suggested in this article, there is no reason why hogs should yield an unprofitable return. Numerous experiments show us that corn, when fed with forage crops, will yield more than the market price of corn; and such balanced feeds insure the most economical, the most rapid, and the largest possible returns.

TRUE NEIGHBORLINESS

Mabel Wheatley, '16

How many of you think that neghborhood "workings" are things of the past? You have read of or heard your grandparents speak of house raisings, quilting bees or corn huskings, but have you ever attended one? There is at least one country community in the State of Tennessee where this custom is not yet obsolete.

There are several occasions when these workings are given, a few of which we shall name: a man is sick and his crops must be cared for; a widow needs a new roof on her house or her fences repaired; a good new neighbor moves into the community and a little help of various kinds would be appreciated; the cemetery and church grounds need a general clearing; and many other instances which could be mentioned.

Don't for a minute think that only the men and boys take part in these affairs, either; for each member of the household contributes his or her share to the jollification. People have been notified of the coming event a week or two ahead of time, and home plans are laid accordingly. The regular work of each family is arranged so that that particular day can be spared from home duties.

On the day before the working, the house-wife plans her contribution to the big dinner. She prepares her chicken for the oven or frying pan and bakes her pies, cakes, and light bread. Vegetables and fruit are brought in from the garden and orchard so that steps will be saved on the following morning.

Five o'clock finds everybody bustling around the next morning; breakfast has been eaten and the feeding and milking are done. The mother finishes her cooking, packs the dinner in clothes baskets and dish pans, and prepares herself and the children for departure.

The father greases the big wagon wheels, puts straw in the bed, curries and brushes the mules, harnesses and hitches them to the wagon, takes a last look at the pigs and calves to see that they are alright for the day, and then drives around to the house. Here he is reminded that the chickens haven't been fed and watered. So, while he does that, the mother sees that the fire in the kitchen stove is safe, and that all windows and doors are closed and locked. Then the lunch is put in the wagon; Tom, Betty, and Sam climb in and seat themselves on the straw, and mother and father occupy the spring seat in front; and they are off for a pleasant day's work.

They reach Neighbor X's in due time, the wagon is emptied, and everybody gets busy. Someone is made head manager of the task to be done and each begins on the work assigned to him. When the men answer the call of the dinner bell they find long, improvised tables spread with all manner of good things to eat under shade trees in the yard. Of course there aren't chairs enough for all, but no one worries about that, for can't planks be put on chairs which are placed at quite a distance from each other and all be accommodated? The men eat at the first table, then sit about and talk for some time before going to work again.

After the women and children have eaten, the dishes have been washed and the remains of the dinner repacked, they usually go out to watch the men work for a while; then go back to the house and gossip till evening, when all go home, happy in having been able to demonstrate a true neighborly spirit.

GROWING AND MARKETING FRUITS AND VEGETABLES

J. W. Lovell, '17

The opportunities for fruit growing and trucking in Tennessee are becoming more general and profitable each year. The Highland Rim of Middle Tennessee and the Cumberland Plateau are destined to become the great fruit growing sections of the South. The soil of these sections where land may be bought for five to fifteen dollars an acre can be made to produce as good apples as are grown in other states where land for this purpose sells at double and sometimes triple this price. There are sections in Middle Tennessee that grow as fine cantaloupes as the famous Rocky Ford section of Colorado; and the strawberries are excelled by none in flavor. In East Tennessee as many as 9,000 quarts of strawberries to the acre have been grown. Some of the gardeners of the Knoxville section ship lettuce to the markets in Florida, and strawberries to Northern markets. In West Tennessee in 1906 the railroads carried to Northern and Southern markets 475 cars of strawberries, 509 cars of tomatoes, and 80 cars of early cabbage in addition to that which

was shipped in less than car-load lots. Potatoes can be grown equally well in all portions of Tennessee.

There are several things to be considered in the running of a truck farm.

First, let us consider the location of farm. If it is located ten miles from a station, and the roads are good, the truck farm should be a paying proposition, provided there is always a stable market.

Secondly, market conditions cannot be overlooked. Whether producing for local or other markets, there is always the danger of over production and of crowding the market, thus reducing the prices. Tennessee, however, is fortunate. Nature gives us two or three weeks advance of the Northern crop, while the more Southern crops precede us by two weeks or a month. Fruit growers and truckers' associations aid the producer in placing his fruits and vegetables on the Northern markets at a small cost and help him secure fancy prices. At Humboldt, there is a strong association of fruit growers. Both local parties and agents of northern firms pay cash on delivery for what is bought. This organization has an inspector of fruits and vegetables on whose certificate everything is sold. This insures a high standard of quality and has proven satisfactory to both buyer and grower. Also, the members of the Association, as a rule, get good prices for their crops.

Thirdly, the size of the Farm is an important factor. A small farm is best suited for trucking, because it is an intensive occupation and requires a great deal of attention. On a large farm the possibilities of success and failure are greater, in fact, often too great for him to engage his attention in trucking as a side line. But trucking in connection with full season crops has been practiced successfully by many, especially in West Tennessee, where there is a favorable moisture supply and a surface sufficiently rolling to insure drainage. Here crop failure in the ordinary sense is unknown. Two or more crops can be grown on the same field. Crop production is not only greatly increased but a long felt need in southern agriculture is fully met by the addition of truck crops to the old scheme. These crops mature in the spring and early summer long before the full season crops can be sold, and thus bring in money at a time when the farmer often finds it hard to make ends meet. Moreover, the intensive culture demanded by truck crops cannot fail in time to have a helpful effect on all agriculture.

Fourthly, the man himself must be considered. Every man is most likely to succeed best where his work is in line with his tastes and inclinations. He should have some knowledge of what such crops require in their production and at the same time a knack for arranging his products attractively. He must also have skill in selling these products. In marketing crops the greatest care should be taken to win the consumer. High quality is essential and attractive appearance is important, also honesty in packing. The

vegetable must be seasonable, that is, ready for the market when the consumer is most anxious for it. The package must be convenient in size and shape. A neat handle is often of great advantage; and if vegetables are of high quality the package should contain the grower's name and address. A nice attractive label is of great aid as an advertisement. It enables the buyer or consumer to know where he can get more of the same product if it has pleased him. Truckers' and fruit growers' associations are a great aid in marketing. This is true, not only in finding a market, but also in protecting the honest trucker. Each trucker is required to label and number his package; and if a bad package is found, it can be traced directly to the one who packed it.

In conclusion let us say, that the South and especially Tennessee has unlimited opportunities for the trucker and fruit grower. The climatic conditions and fertility of its soil are excelled by few if any of the states of the Union. Its water routes offer good shipping facilities; and its railroads are convenient to most farmers, and lead to all the principle markets. Therefore, the future prosperity of the trucker of Tennessee seems to be assured.

THE KEEPING AND STORAGE OF SWEET POTATOES

C. E. Johnson, '17

The storage of sweet potatoes during the winter months for the purpose of marketing in the early spring has brought maximum profit to those who have tried it. The conditions of storage, however, have been so variable that the average farmer does not take advantage of the profits coming from this additional labor. But within the last few years the uncertainty of these conditions has been reduced to such an extent that any one can afford to store his potatoes. For carrying on this work the following principles, if adhered to, will give good results.

In the first place, the crop should be mature before harvesting, as immature potatoes contain a higher percentage of moisture than mature ones and, therefore, are more subject to rotting. Also, since the starch content of the potato is reduced greatly while in storage, it is necessary that the roots contain the maximum amount of starch before harvesting. Slips which have been transplanted in May should have mature roots by the middle or last of September.

Second, the sweet potatoes should be dug before the frost falls and during a cool dry period. Experiments have shown that when dug during a rainy season they always keep poorly. They should be handled carefully and placed in the shade as soon as possible. If potatoes are cut or broken and the milky juice turns to a dark greenish color as they dry by the air, then their keeping qualities are very poor; but if the juice dries white the potatoes will keep well in storage.

Third, the excess of moisture in the newly harvested potato must be driven out, and in order to accomplish this satisfactorily, the temperature must be kept at 90 degrees F. for at least a week after the roots are stored, while at the same time good ventilation should be given. They may be kept when the temperature to which they are exposed is within the limits of 38.1 degrees and 80 degrees F., with an average of about 52 degrees. Damp atmosphere is not prejudicial to their keeping nor is the presence of diffused daylight.

In addition to these principles, we may say that the keeping quality of the potato depends largely upon the fertilizer used upon the soil during cultivation, and upon the variety of the potato. It has been found that sweet potatoes fertilized with kainit, after storage of 140 days lost 30.7% of the starch originally present; with muriate of potash there was a loss of 34.4% of starch; and where no fertilizer was used there was a loss of 32.1% starch. A high percentage of starch was usually accompanied by a low percentage of sucrose, while the glucose content was not subject to variations.

Highly nitrogenous fertilizers and clay soils produce rough potatoes which are cracked at time of harvesting. A sandy loam produces the best potatoes for keeping purposes.

The best keeping varieties for stock feeding are: The Triumph, Enormous, and Southern Queen. For the table, the yam varieties, Golden Beauty, Nancy Hall, and Providence rank in the order named. The Hanover will preserve the largest percentage of starch, followed by the Georgia Buck.

Experiments have proven that fungicides do not prevent the decay of potatoes, as may be shown by the following data. Potatoes treated with formalin solution, let dry and hilled, 74% kept, while of those not treated, 85% kept; also Bordeaux mixture was tried and the same results were obtained. Hence, we must depend upon storage for the keeping of our potatoes.

The manner of storage depends upon the yield of the crop.

1. Large yields should be placed in storage houses.
2. Medium yields should be placed in hills.
3. Small yields should be placed in barrels.

Anyone who wishes to obtain plans for a storage house may get them from the Georgia Bulletin, No. 107, as space will not permit me to give them here.

At the South Carolina Station, sweet potatoes of the Carolina Yam variety were dug October 26-28, during dry weather, and were packed in lime barrels October 30-31. The packing materials used were sand, cotton-seed, cotton-hulls, damaged lint cotton, wheat bran, newspapers and hay. Good results were obtained with the dry sand and hulls, while the wrapping of each potato with paper induced decay. The other materials did not give desirable results.

If the potatoes are to be stored in hills, there should be built a

four-sided flume about one foot higher than the hill is to be. Then bore three-quarter-inch holes about 6 inches apart on each side of the flume as high up as the potatoes are to be piled. Next dig out a hole 5 or 6 feet in diameter or as large as you wish it to be, then spread excelsior, or fine straw to the depth of 5 or 6 inches. Set flume in basin and pile potatoes around it in cone shape. Then cover the potatoes with straw to depth of 4 or 5 inches. Corn stalks should top this, and enough dirt should be thrown around the base of the hill to hold the corn stalks in place. This hill should be built under shelter in order that the potatoes may be kept dry.

LENGTH OF LACTATION PERIOD, AND SPRING vs. FALL FRESHENING

W. A. Shadow, '17

There is a difference of opinion among dairy men as to the length of time a cow should be milked during the year. Some say that it is more profitable to breed a cow so that she will freshen every ten months. This claim is made, because a cow usually milks heavier when fresh, and in an eight-months lactation period is milking fresh oftener than in a ten or twelve months' lactation period. On the other hand, the cow with an eight months' lactation period has the longer total dry period and this in a way draws the profit from the milking period. Of course, it is clear that a greater number of calves are born if the cow freshens every ten months, and this is a point to be considered by the man who sells pure-bred stock.

Experiments by the "Richmond-Lewiston Cow Testing Association" of Utah suggests no correlation between length of milking period, and the fat and profits produced per year. Experiments do not point strongly to any certain length of milking period as being best. This, taken with other factors, makes it more desirable to have the cow freshen every twelve months, allowing six weeks of this for dry period before calving.

It is more convenient as well as more profitable to have the cow freshen every twelve months, since this makes it possible to have the calves come either in the Spring or Fall rather than in the extremely hot weather of summer. There is some debate concerning spring and fall freshening. From more or less theoretical consideration, it appears that a cow freshening in the fall should produce somewhat more milk and butter fat than if she freshened in the spring. The reasoning which led to this theory is somewhat as follows:

A cow freshening in the fall goes onto dry feed of the usual winter ration, stimulated to high milk flows by recent calving. By spring the organs of milk secretion are not so active, but at this time she is turned to fresh grass on pasture which stimulates the organs of milk secretion and in-

creases the production for some time at least.

On the other hand, a cow calving in spring is on green feed when it cannot act as a stimulating factor, for she is already stimulated to the height of her production by the instincts of motherhood. She milks along until fall, failing somewhat in her production. Here she is put on winter feed, and cold weather causes a further shrink from which she does not recover until another freshening or stimulation from green feed.

In order to test the truth of this reasoning the production of fall and spring freshened cows was recorded in the following table, which was taken from Bulletin 127 of Utah Experiment Station:

	Spring	Fall
No. of Cows	51	35
Av. No. of Months Dry	1.42	1.21
Lbs. of Fat	280.5	325.6
Cost of Feed	$38.41	$43.74
Profit	$58.49	$67.92
Returns for $1 Expended for Feed	$2.52	$2.55

From the table it will be seen that fifty-one cows freshened in the spring, and thirty-five in the fall. They were dry, on an average, about the same length of time. There is rather a surprising difference in the amount of fat produced. Fall freshened cows produced 45.1 more pounds of fat, and $9.43 more profit than the ones freshened in the spring. The returns for the money invested in feed are 3 per cent in favor of the fall group.

Labor is more plentiful in Tennessee during the winter months than at any other time; and the cow that freshens in the fall will receive better attention for the year than one that calves in the spring and is dry when labor is plentiful.

The calf that comes in the fall is more fortunate, because of the extra care it will receive over the spring calf. Experiments of several stations show that the fall calf cared for properly is larger and better developed at the end of one year than the spring calf. The fall calf receives more attention at the beginning, because there is not the rush in work that goes hand in hand with spring. The calf grows well on dry feed and milk until it is six months old, when it is turned on grass. There is no question about the growth of the calf on grass. It is about twelve months old when it is expected to live on dry feed and silage. As a result its digestive apparatus is better developed, and it can stand winter feed better than a calf that meets the winter at six months of age.

If the calves come in the spring they are liable to be neglected; for there is so much else to be done at this season of the year. This is especially true with the average Tennessee dairyman who has other interests than his dairy herd. The calves are the foundation of the coming herd, and extreme care should be given them in their young state.

From the discussion that has been put forth, it seems very reasonable that the best solution of this problem is to allow the cow to

freshen every fall about the same date, and allow a dry period before each freshening of from six weeks to two months.

FARM PRACTICE IN THE CONTROL OF FIELD-CROP INSECTS

(Review of 1905 Year Book)

A. Jesse Winegar, '16

The general system farmer has a broader field than does he who has specialized in orcharding, trucking, or in some other one crop system. This applies particularly to the insect control side of the system. The orchardist knows his work and must necessarily know his insect enemies in order to cope with the other man who has this knowledge well at hand. He realizes his fruit must be superb in order to obtain top notch prices. But—a pity it is so —the field crop man has not yet realized that there are insect enemies in abundance out there working day and night against his interests. I say he has not yet realized this—perhaps that is a little strong. But I can say with sad conviction that he does not fully realize the great amount of work these little fellows are doing. Yes, they are small all right, but they have their entire force at work—thousands of them. We have failed to take into account that when we brought this field into cultivation we were supplying one crop where formerly many grew, we fail to consider that these pesky little fellows are rustlers and will attack this matured pet crop of ours. Nature attempts to help us all right in supplying us with friendly insects, those which are destructive to our enemies; but we can't ask Nature to do all the work while we go on our way in opposition to her methods. That old adage might certainly be applied here, Nature "helps those who help themselves." Therefore, since we are responsible for this upset of the natural order of things, we must go a step farther and render these conditions as unfavorable and unpleasant as possible for these enemies. We may not be able to exterminate them, but we can thin the ranks considerably. In order to do this, what shall we do? It might be too tedious, too technical and require expenditure of too great amount of time, money, and energy to know these ensects individually. So, we win by fighting them in groups, and thus by generalized methods—methods which any and all farmers can employ individually. It frequently occurs that different insects having one like habit can be effectively controlled by a single operation or remedy.

We mentioned above that a technical knowledge of insect life was not absolutely essential; but we, as farmers, should be able, in part at least, to distinguish the stages of development of the most common insects which we must control. Likewise we must know their means and methods of living and attacking our crops. Farming

is our business, and we must have a business acquaintance with these fellows. We must not be satisfied with a business knowledge pertaining to management and breeding of live stock or of your crops, and the system of cropping, but we must realize that we are wonderfully "back in the woods" if we have not a knowledge of the insect pests of the farm. This is knowledge we cannot afford financially to be without. Ignorance of this phase of farm-management is costly. So, why not awaken? The loss of a cow, a horse, attracts our attention. Calculate the cost of harboring these insects and our attention will likewise be attracted. What shall we, as farmers, do in case we find an insect which we are not able to control? This is easy. We apply either to the Bureau of Entomology of the State or of the Nation for aid.

Practically all of us now believe in and practice crop rotation, but we do so for the cropping advantages. However, we are coming to realize that other reasons loom up high for rotation. Insects in general cannot abruptly change their habits without fatal results. Thus, by rotation we either destroy, starve, or force them to migrate. Here, we are assisted in controlling the insects by heat, cold rains and winds. This is especially true of the Hession Fly and the wheat midge. Others, as the wheat straw worm, are unable to fly; thus it is especially advantageous to change the wheat crop, and especially not to allow volunteer wheat to grow in the old wheat field, since this furnishes only food for those remaining. Again the chinch bug can be controlled from his destruction of timothy by not allowing the timothy to occupy the same field for more than few successive years. Likewise the grub worm can be controlled. Perhaps as important reason for rotation is seen in connection with the western corn root worm. Eggs are deposited in late summer and fall about corn roots. They hatch the following spring and the larva devour the roots, causing the loss of millions annually. Rotation of crops here, by using small grains for a single year of young crop will control these completely.

Crop rotation is not, however, a "panacea" for all insect troubles. It may be used so as to be actually disastrous, as in changes from a grass to a grain crop, or in the bringing into cultivation of swamp lands. We would make a serious mistake to destroy all grass plants in the field by breaking, leaving the insect hungry, then planting corn —expecting them to overlook it. In some sections great loss is realized just here. A period of time must elapse between the destruction of the grass and the planting of the corn in order to starve and drive the insects out.

In reclaiming swamp lands, we should plant in summer, fall, and again in spring upon planting corn; or better still, crop with rye or vetch before attempt to use corn at all. Familiar difficulties are met with in timothy meadows of long standing. The bill bug breeds in the roots of the grass, and will sometimes kill portions of

the grass. This bug develops in fall and remains in field over winter, waiting to begin work with renewed energy the following spring. If we break in the spring and plant corn, the pest attacts the corn causing "frenching" or killing it outright. But if we break in the fall, it will be driven out or frozen to death—a very important thing to be remembered. Of course problems of erosion come in here, especially on upland, but we should overcome this by cover crop.

Efficient measures for extermination of insects are summer fallow, and summer, fall, and winter plowing. The clover root borer, a small brown insect whose young is a white grub with brown jaws. Its eggs are deposited in May and June, the young, as soon as hatched, begins its devestation, with clover dying in spots, as a rule. The young are footless, without eyes, and thus depend on the roots for sustenance. Thus after the crop is harvested, turn this grub to the action of winter's cold and rains, and it perishes. And the same as above, seed again to wheat or cowpeas. We should remember three groups of insects in effecting a change from grasses to corn: cutworms, wire worms, and grub worms. Each group differs considerably. Probably four-fifths of the loss to corn growers in the United States is due to these groups. Yet, many of these are controlled by summer fallowing and fall or mid-winter plowing. In some upland regions this would not be practical, since erosion would deplete the soil fertility. Then, we would turn in spring and plant immediately, allowing the pests to continue eating on the grass roots. Thus the corn gets a firm rooting and is not completely destroyed.

Every successful farmer recognizes the fact that stunted young stock can never give the same returns as those which have the necessary foods for complete development and healthy growth. This applies equally well to plants. The seed bed should be thoroughly prepared. Thriftiness in plants means a hardiness to resist insect attacts. If every root or root-hair sent out is able to get moisture and nourishment, it is going to require a severe attact of insects to destroy the plant. On the other hand, if the roots go begging, the fight will be easy. Again, the aphid of the corn, which is the "ant's cow" can be efficiently controlled by frequent stirring of the soil before planting and even after until it is dry some few inches. This is to disarrange the homes of the ants harboring in the soil or around the corn root. Also, time of planting is a factor in control. Don't rush the season by trying to be the first to plant. Let the weather get warm to drive the insect in and bring the corn rapidly on.

Common carelessness of the farmer is costly. He allows his premises to gather rubbish and filth, as in fence rows. Chinch bugs have actually been traced to shocks of corn which have been allowed to stands over winter in the wheat field. Likewise, insects harbor along such hedges as the Osage

Orange. Roadsides, matted grass and weeds furnish ideal places for the insects to pass the winter. The timothy joint worm and the clover flower midge can be controlled be cutting before these crops bloom. Or pasturing early in the season and retarding blooming will control these insects. Thus, the farmer who is keeping his premises free from these harboring places by burning, mowing or pasturing is saving his money. He is using the "ounce of prevention."

The control of the Hessian fly is one of the greatest economical problems in some of our wheat sections. The time of seeding the winter wheat is an important problem. The fly produces two broods. It breeds only in wheat, rye, and barley, chiefly wheat. Thus if seeding is delayed until after the fall brood has come and gone, little injury will be received. Thus late sowing in fall is recommended. And, if there are no flies in the fall, there will be none in the spring, since the origin of the spring brood is in the fall brood. This knowledge is being successfully used in many sections.

Spring grown wheat, however, brings new difficulties; but this is of less importance in our section.

So finally, we have learned that it is the farmers themselves, who feed these pests through ignorance, lack of interest or lack of business ability. We must remember that we cannot cope with the insects singly, but must adopt a system which will incorporate general preventive methods. Just such methods are being employed by our most successful farmers. Why not by all? Get busy; wake up. Cease paying this excessive unnecessary tax and plan a campaign against these robbers.

MARKETING AND FARM CREDITS

(From the National Conference)

From Chicago comes the announcement that the National Council of Farmers' Cooperative Association has joined with the general committee of the National Conference on Marketing and Farm Credits in issuing a call for a third conference to be held in Chicago, November 29 to December 2. The purpose of the Conference is to frame legislation for submission to Congress at its coming session, intended to provide adequate banking accommodations for farmers, to stimulate the movement for standardization of farm products for purposes of distribution, and to promote the organization of agriculture along lines which will develop the business side of this fundamental industry.

Delegates from the National Farmers' Union, the National Grange, the state branches of the American Society of Equity, and other organizations, individual farmers and land owners are invited to represent the agricultural interests in this conference, while the financial interests probably will be represented by committees from the American Bankers' Association and the Farm Mortgage Bankers' Association. With a view

to securing quick action and obviating the necessity of extended hearings in Washington, the joint committee on rural credits of the United States Senate and House of Representatives has been asked to attend and to participate in the proceedings.

Particular interest attaches to the active part taken by the National Council of Farmers' Cooperative Associations which recently won the fight against an increase in grain freight rates, thus saving between $6,000,000 and $7,000,000 annually to the grain growers of the middle West. It is considered significant that an organization so widely representative of agricultural interests is now turning its attention to legislation on rural credits.

NEWS

Lee K. Standifer, '15, is now in charge of the Creamery at the Experiment Station and H. E. Baker who was in charge is again in the field in the interest of the Creamery.

On Tuesday night, Oct. 5, 1915, Prof. Morgan addressed a joint meeting of the Agricultural Club and the Domestic Science Department. Prof. Morgan spoke of the need of leaders in rural work. He said that men and women are needed who are willing to sacrifice even their lives in bettering rural conditions, and expressed the hope that all present might get the broader view of life and have more than merely a selfish purpose in the work. The Domestic Science Department and the Agricultural Club will in the future meet jointly once a month. Rural problems of interest to both departments will be discussed.

D. K. Young, Jr., owner of Eagle Bend Stock Farm in Anderson County was a recent visitor. He is an old U. T. man and visits often.

Robt. L. Taylor, '15, who was a member of the champion football team of last year has matriculated and reported to the coaches again.

Prof. A. S. Adsmond, Demonstrator for Anderson County, was in town on the day of the Tenn.-Clemson game.

Frank Harkleroad, '14, has given up his work as demonstrator in Greene County and has entered the University of Illinois.

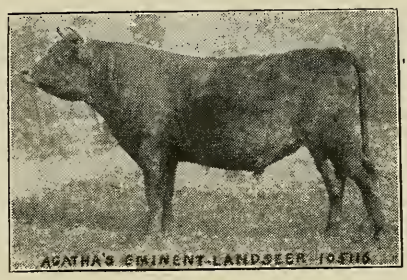
All the silos at the Farm have been filled, and the remaining silage is being hauled over to the Cherokee Farm and put in the new silo there. Barley and clover on the Cherokee tract are looking fine.

Agatha's Eminent Landseer 105116 recently died at the farm. The trouble was Entiritis. This bull was bought as a calf from May Overton at Nashville. The breeding on the sire's side was a rich Tennessee Jersey family. He was one of the closest living de-

cendants of Landseer's Fancy.

The breeding on the dam's side was entirely Jersey Island breeding as his dam was an imported cow. The dam was a half sister to some of the most noted bulls of the day, as Gamboge Knight, Combination, Admiral Togo, and Soutan of Oaklands.

He was a bull of extraordinary individuality, possessing extreme dairy form and an ideal Jersey head. The Station valued him at $1500. He had proven himself in the Station herd in that his offspring were of ideal Jersey type and possessed extreme dairy quality. His loss is greatly regretted owing to the fact that he was a prepotent breeder of desirable Jersey characters. Sires combining these qualities with sureness are hard to obtain.



Golden Fern's Gamboge of the Island Home Herd added another state to his list as grand champion bull at Birmingham recently. The Island Home Herd has won seventy three ribbons at Nashville, Louisville, Memphis, and Birmingham. Before returning the herd goes to Meridian to the Miss.-Ala. fair, and then Jackson to the Mississippi State fair. Cowslip's Maid, a beautiful little heifer has not been beaten for first.

The U. T. FARMER

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Published Monthly by the Agricultural Club of the University of Tennessee

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EDITORIAL

At this season the thoughts of the farmer are turning from the larger outdoor activities to the smaller tasks of the farm. This has been a good year for most of the crops. The barns, haymows and granaries are already full; the tobacco is hanging in the barn; the cotton pens are bulging and on these clear frosty mornings the corn snaps briskly and we hear the merry ringing of the big scoops as it is shoveled into the crib. Then with apples in the cellar and potatoes in the hill, why should not the farmer have a bit of time to think of other things?

There are the barns to look after with stalls to repair, windows to replace, and doors and latches to be made secure in order that the animals may be housed safely and comfortably through the coming winter. Then there are roofs, fences, and gates to look after before bad weather comes. Those small gullies may be stopped now with only a little labor and thus preventing considerable damage from erosion by the winter rains. It is a good time to lay in plenty of firewood to last until spring and so avoid the common and unpleasant experience of cutting and hauling wood when snow is on the ground. It seems reasonable to suppose that the average farmer has enough forethought to do these things while the time is ripe; but we know from experience as well as observation that these necessary tasks do not receive the attention they deserve because they are usually classed as the little things which can always wait. But many little things amount to as much as one or two large ones and it is through the little leaks that the profit disappears.

Aside from outdoor work concerning the farmer, there are problems of interest to his family. Reading matter for the long winter evenings should be supplied and the head of the family should know or learn something about the selec-

tion of good books and magazines. Valuable information and good suggestions can be obtained along this line from the Department of Agriculture at Washington upon request. Meanwhile, the farmer should be counting profit and loss and cost and selling price of various crops and animals to determine just where he stands financially and which crops or kinds of stock are proving most profitable. Now is a good time to start the keeping of an expense account. Once started, we venture to say it will not be discontinued.

In every scene or picture of country life in autumn one of the most important features is what is commonly known as "the little red school house." Although in our memory it stands out prominently as the little log school house on the hill. With their little oil-cloth booksatchels barely large enough to hold the Geography (which as a result was seldom carried home) well filled dinner baskets, and perhaps a big red apple for the teacher, the girls and boys trudge over the hills and across the fields from a distance of a quarter of a mile to three miles to partake of the wonderful things to be learned in books. We remember walking two and a half miles, which often seemed more like five; for the roads and paths were often muddy, almost to the point of being impassable. In many parts of the State the school gets a good start and is then suspended for a month or more for cotton picking and other work in which the children can help on the farm. When it gets another good start several of the smaller children have to drop out on account of the weather and bad roads. Those who attend the entire term (which is at best too short) get well along in their books only to find the next year that the poorly paid teacher has been succeeded by another who has no knowledge or record of the advancement or classification of the pupils. As a result many children do practically the same work done in the previous year and with little advancement. But the blame is not always to be placed on the teacher. She usually has about thirty boys and girls of all ages, grades, and characteristics in one room. Under such conditions there is small hope for any teacher to bring out the best that is in the child. How long will it be until the people of Tennessee wake up to a realization of the weakness and incompetency in the rural schools and see that the little crowded one-room building with one over-worked teacher gives way to the modern consolidated school building of three or four rooms and as many teachers, each a specialist in her department? Then and not until then, can we hope to have every child attending school every day in a wagon, enjoying the conveniences and comforts of a modern building and reaping the benefits of a systematic course of study and classification, getting credit on permanent record books of work done, advancing steadily, completing the course at an earlier age, ready for high school; and, what is more, at the same time getting more out of country life in the enjoyment of its priviliges and the appreciation of its possibilities.

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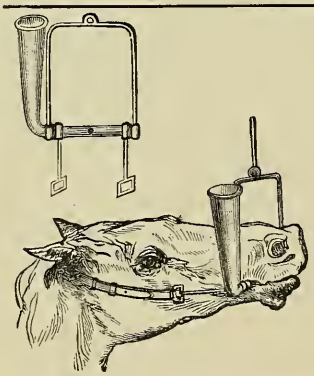

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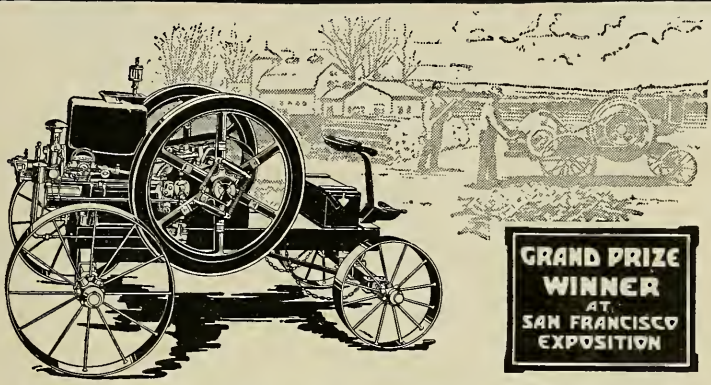

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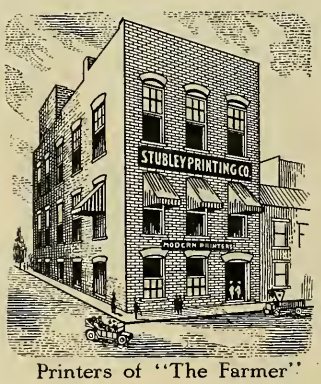

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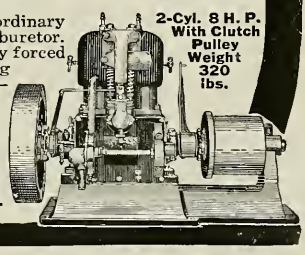

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Vol. X DECEMBER, 1915 No. 3

Published Monthly By

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Contents

Timely Suggestions for Recognizing and Controlling the Hessian Fly ---------- 67
E. F. Arnold, '16

Cooperative Horse Breeding ---------- 71
A. Jesse Winegar, '16

Fraternities ---------- 75
Elizabeth Wilson, '18

Hints on Rural Cooperation ---------- 76
R. O. Bates, '18

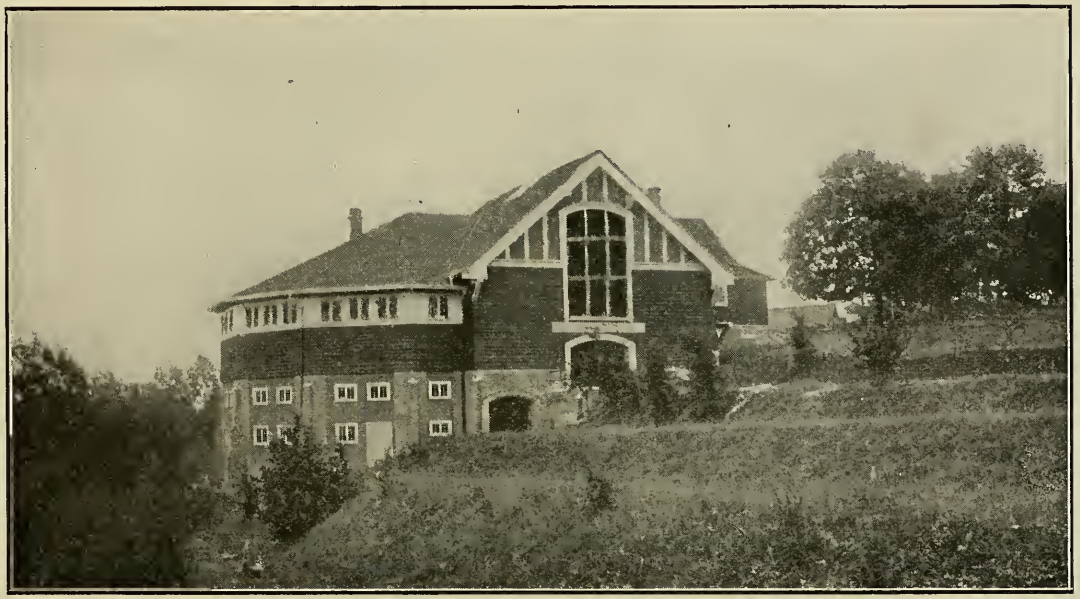
Is Beef Incompatible with Milk ---------- 79
H. B. Drane, '16

A Brief History of the Shorthorn ---------- 81
H. H. Wilson

Editorial ---------- 86

News ---------- 88

Notes From Mississippi Bureau of Extension ---------- 90



O. P. TEMPLE HALL, WHERE SHORT COURSE MEN WILL MEET

THE U. T. FARMER

Vol. X | DECEMBER, 1915 | No. 3

TIMELY SUGGESTIONS FOR RECOGNIZING AND CONTROLLING THE HESSIAN FLY

E. F. Arnold, '16

There is a certain little insect that has been very busy in the wheat fields of Tennessee this fall. On the blades of the wheat it has deposited eggs which hatched out in about seven to fifteen days into larvae or little maggots. These fed upon the stalk, beneath the sheath until about the first of November or later. Now the interesting thing about this wheat insect is, that with the approach of cold weather it enters lower into the sheath of the wheat plant and transforms itself into what is known as the flax-seed stage, a resting state. This little pest is now housed in the sheath of the growing wheat passing the winter cosily waiting for warm weather to come when it will emerge from the inactive flax-seed stage into the dreaded Hessian Fly. Let every farmer who has been introduced to the Hessian Fly go out now into his wheat field and examine closely and see if he cannot find bunches of wheat that are stunted or dwarfed with broader and greener leaves as shown in the cut below. If such plants are found, pull one of them up and carefully pull the blade from the stalk and you will find the Hessian Fly in the maggot or flax-seed stage snugly passing the winter waiting for the spring. Then it appears as a very small, gnat-like fly and again lays eggs that hatch more larvae or maggots which do the real damage to wheat. The yield is often reduced four-fifths. Just before ripening you will notice the wheat heads dropping over, and before the wheat is harvested the larvae again enter the sheath or lower part of the stalk and pass into the flax-seed stage and remain here until August or September, when they come out again and deposit their eggs on young wheat plants. This completes its life cycle. Thus you see it produces two broods each year.

To combat this insect pest, we are told first to study its habits. We have before us the habits of the Hessian Fly. How are we to control or destroy this pest? Suppose you go into your field and find that it is badly infested. Now, what steps are you as a farmer going to take? There is nothing you can do to save your present crop, but you can take steps to protect your next crop, which are as follows: first, after the wheat is taken off plow the stubble deep and seed it to some other crop. But why this?—some may ask. You

remember the Hessian Flies are in the flax-seed stage and if the stubble is turned deep, many of them will never find their way to the surface again; and those that do will find no volunteer wheat upon which to lay their eggs. Since there is no other plant on which they lay eggs to any appreciable extent, the fall brood is destroyed. Some one is waiting to ask about the wheat crop that is to be sown on the farm? Will the fly that is not destroyed by the deep plowing not fly over to it, even if it is over in another field, and deposit its eggs? Yes, if the wheat is sown early. The wheat, if possible, should be sown after clover or some other legumes as peas or beans. This would permit a later sowing of wheat; for the extra nitrogen from the legume crop would give the wheat a more rapid growth. There can be given no definite date for seeding wheat. If it is a late fall, as it has been this year, the farmer can sow wheat later. While on other years the bad weather may force him to sow earlier. The date of sowing must be determined by the farmer himself. He should sow as late as possible not to cut his yield short—say from October 20th to October 25th. There are others, pehaps, who are wanting to know how they are going to keep down volunteer wheat when they have clover and grass sown in their wheat. Now, my farmer friend, you have made a mistake by sowing clover or grass in your wheat, if your neighbors intend sowing wheat next fall. Why sow clover and grass in wheat? You can get far better results by turning your land and seeding it to clover and grass than by sowing with wheat. At the same time you are enabled to keep down the much dreaded Hessian Fly.

The Station, on account of the unusually late fall, has received a large number of complaints from farmers all over the State concerning the Hessian Fly. Prof. G. M. Bentley, Associate Professor in Entomology at the University of Tennessee, recently made a special investigation of the damage being done by the Hessian Fly on a three-hundred and twenty acre farm near Sweetwater, Tennessee. This farm last year produced forty-seven bushels of wheat per acre. He found that this farmer had begun sowing an eleven and one-half acre field, at the rate of one bushel and one peck per acre, on the 16th of October. Just as he had finished the second round with the drill it began raining, which delayed the sowing of the remainder of the field until October the 23rd. An adjoining field of seventeen acres was sowed on October the 24th. After a careful investigation, counting a number of plants, they concluded that it was conservative to estimate the infested plants of the two rounds sown on October the 16th at eighty-five percent. That part of the field sown on the 23rd of October was estimated at from 2 to 3 percent. They found no infested plants at all on the field sown on October the 24th. Now let us draw some conclusions. Had all the wheat been sown on October the 16th, the farmer would possibly

have gotten a yield of ten bushels for the 11½ acres with an eighty-five percent infestation. So you see, my farmer friend, it pays to study the season and sow as late as possible, not reducing your yield thereby. This also shows that this fly must have laid these eggs on this wheat about October the 23rd, which is unusually late according to other information to be had on its time of depositing eggs. Hence, this extreme late fall must have permitted the Hessian Fly to have produced two broods. The time of seeding is a big factor in wheat production. Bear in mind that weather conditions modify seeding dates.

Professor G. M. Bentley brought back specimens from the eighty-five percent rounds, the two to three percent field, and the adjoining field that showed no infestation at all. (The cut in this issue was taken from these plants and shows normal and infected plants). He had a large number of these plants placed in the class room for our inspection and the class period was spent with a great deal of enthusiasm studying the fly, its habits

NORMAL PLANT INFESTED PLANT

and practical methods for its control. We found all stages of the larva from its first hatching from the eggs to the flax-seed stage. The Station advised this farmer to turn under deep the first two rows sown and leave it so turned until spring. To have left this highly infested area would have given very little wheat and at the same time would have furnished numerous flies to lay eggs next spring on the balance of the wheat near by and cause much damage. The number of flies that it would turn loose in the spring could be estimated somewhat from the following. Professor Bentley gave to each member of a class of thirty-two one stalk to carefully dissect and count the number of flies in larva or flax-seed stages. The number per stalk, all stages, ranged from one to thirty-one, and the average per stalk was six and twenty-one thirty-seconds. So you see that if thirty-two stalks turned loose two-hundred and thirteen flies we would expect a dangerous number from two drill rows around the eleven and a half acre field. From this, you can get an idea of what damage a few stalks of early volunteer wheat may do. Suppose one-thousand grains of wheat comes up after cutting, which may easily occur from a stray bundle of wheat left in the field or around a single shock of wheat. In this you would harbor over winter 6,666 flax-seed. This would make as many flies to lay eggs on your wheat next spring at the rate of 100 to 150 eggs per fly. Is it worth while to so rotate your crops to destroy all volunteer wheat? Can we as farmers afford to continue to sow clover or grass in our wheat? If every farmer in Tennessee would see to it that there is no volunteer wheat on his farm, sow wheat late on ground and in the best possible condition, we would have the Hessian fly damage reduced to a minimum.

There are, however, other insect pests that attack our cotton, corn, and, in fact, every crop we grow; but space will not permit us to discuss them here. There are certain principles of insect control, however, that have been worked out for Tennessee by Professor Bentley. These must be thoroughly understood before anyone can successfully combat these harmless looking creatures, which may have three or four stages in their life cycle, each stage being different from the other. By means of these stages, they adapt themselves to weather conditions. Some bury into the ground with the approach of cold weather and pass the winter in the pupa or the larval stage. Others weave about themselves silky cocoons in which they pass the winter. The Hession Fly enters into the wheat sheath and changes into the flax-seed or pupa stage. Some insects produce a brood every seventeen years, while others produce a single brood in one, two, or five years; and some produce from two to twelve broods every year. Possessing as they do the "first mortgage" upon life, that is the ability to tide themselves over extreme weather conditions, it bcomes a prime necessity in insect control to observe the following principles as worked

out by Prof. Bentley, for this State which are as follows:

PRINCIPLES OF INSECT PEST CONTROL

Know Habits of Insects.

Nature of Injury—Chewing, Biting.

Development—Three stage, four stage.

2. Learn time when pest can best be controlled.
   (a). Location—Soil, Wood, Bark, Fruit, Litter.
   (b). Stage of Development.
3. Adopt most practical method of control.
   (a). Natural Enemies—Birds, Toads, Fish, Ladybird Beetle, Syrphus Flies, Ground Beetles, Fungi.
   (b). Parasites—Mantids, Predacious Insects, Ichneumon Bees, Braconid Bees, Chalcis Flies, Tachina Flies, Aphis Lions.
   (c). Farm Methods—Clean Culture, Crop Rotation, Deep Plowing, Drainage, Fall Plowing, Fertilizer, Trap Crop, Seed Selection, Time of planting, Weeds.
   (d). Insecticides—Poisons, Contact, Fumigants, Repellants.
   (e). Spray—(a). With a definite purpose. (b). At proper time. (c). Thoroughly. (d) With sprayer adopted to needs.

Now far a brief resume of these principles. Suppose we have an unknown insect destroying our crop. The first thing to do is to study its habits. Learn whether or not it chews its food or sucks it from the plant. This is important if later you decide that the use of an insecticide is the most practical way to destroy this pest. Next, find out how many stages of development in its life cycle. By studying its location and development we learn the time when the insect can best be controlled. After these conditions are thoroughly understood, we are in a position to choose most practical method of controlling the insect. It may prove that the encouragement of its natural enemies, or the introduction of some parasite will be sufficient. Again it may call for the use of some one of the insecticides or some change in our farm methods, as in the case of the Hessian Fly. Remember, that in order to destroy this pest, we must cease, as farmers, one and all, to sow clover in our wheat, and must watch for and keep down volunteer wheat and oat plants and heed the time for sowing our wheat.

COOPERATIVE HORSE BREEDING

A. Jesse Winegar, '16

Our farmers of the South are fast realizing the possibilities of, and the necessity for, cooperative organizations in order that they may be more efficient citizens, that their community life may be more congenial and progressive, and that their pocketbooks may be heavier. The wide-awake, active, successful ones have discarded the old unsuccessful idea of "It must go as I say," which has been the great

obstacle in the way of cooperation. Instead we have the broad smile, the keen business insight and we have learned that by aiding our fellows we are aiding ourselves. This explains why we have cooperative organizations in numerous fields which are realizing unusual success. However, it yet remains to perfect the breeders' organizations. Especially is this true of horse breeding.

Never, perhaps, has there been such an opportunity to introduce the cooperative method as now. Heretofore we turned towards Europe for our pure-bred horses. But now, because of the present war, we realize that the supply of the future demands for horses of merit must be largely from the United States. The opportunity is ours, and I can conceive of no more satisfactory means of meeting it than through cooperative horse breeding; for the method is well adopted to the improvement of high-grade horses. Animals of high merit cost too much for the individual, since he already owns a good boar and a pure bred bull. Thus we urge cooperation as a means of overcoming this difficulty.

A number of so-called cooperative plans have been devised. The most familiar of which, perhaps, is the purchasing of stallions for community use as adopted to a large extent in the western states —especially in California. But the results have not been satisfactory. In the first place, the methods have not been cooperative. The so-great-need for the development of high-grade horses has paved the way for the tricky, oily-tongued salesman representing some "Stallion Promotion Scheme," he being interested only in getting a bunch of notes signed by men whose names were good at the bank. The disappointment resulting from the method of these schemes has greatly hindered the bringing about of successful cooperative ownership. Among the objections to the methods which have been offered, I mention the following. It is organized from without—true cooperation originates from within. Again, if the requirements are not met, the company claims that their agent did that which he had no authority to do and the organized company is the loser. But a note-worthy objection is, that stallions of ordinary merit are foisted on them at an outrageous price, a part of which pays for the "watered stock" and the salary and expenses of the salesman. Geo. M. Rommell of the Bureau of Animal Husbandry in Circular 124 says that, "stallion owners estimate that it costs on an average of about $1,000 to sell a stallion by the company system." Who pays for this unnecessary expense? Thus the idea of cooperative horse breeding, when suggested to one who has experienced or heard of these over charges and unscrupulous practices, serves only to recall the outcome of some such method and serves to prejudice the listener or reader against the true cooperative plan. Let us as southerners profit by the experiences of our western neighbors.

Upon the cost of stallions we wish to base our chief argument for cooperative horse breeding. In the western states the "Stallion Promotion Schemes" referred to have been forced out and the public auction has taken its place. The following tabulated list taken from Breeder's Gazettes of 17 Auction sales of 259 head of Percheron Stallions, shows that the average stallion costs $568.54, which is, we see, far below the sale by the company scheme. Does not this saving appeal to your good common horse sense.

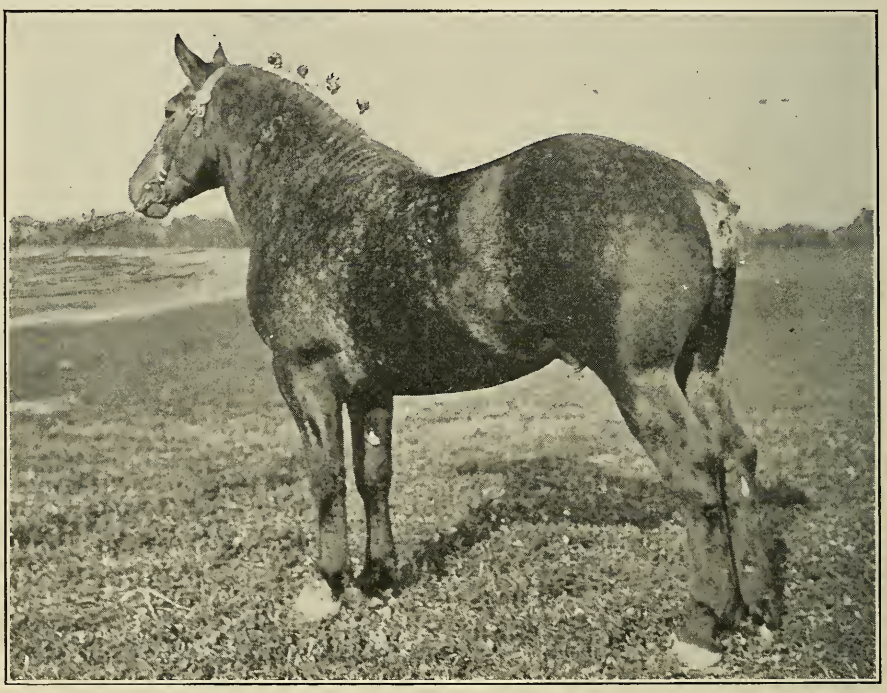
Name of Breeder and Place of Sale	Date	No. of Head	Av. Price
Stetson Bros, Newport, Ill.	Dec. 17, 1912	12	$343.75
H. G. McMillan & Sons, Sioux City, La.	Feb. 18-19, 1913	11	536.50
P. W. Moir, Mitchell, S. C.	Feb. 20, 1913	17	392.00
J. C. Robinson & W. R. Brown, Kansas City, Mo.	March 5, 1913	24	594.00
R. C. Donnen & H. C. Lourey, Marshalltown, Ia.	March 6, 1913	17	466.00
North & Robinson Co., Grand Island, Neb.	March 20-21, '13	14	767.00
Jas. G. Boyd, Nulwaker, Wis.	March 26, 1913	13	589.00
Lee Bros., Manhatten, Kans.	Jan. 27, 1914	11	530.45
C. A. Randolph, Fowler, Ind.	Jan. 30, 1914	18	431.00
Lakewood Percheron Co., Sioux City, Ia.	Feb. 10-11, 1914	17	770.00
Pabst Stock Farm, Ocowomowoc, Wis.	Mar. 4, 1914	12	518.00
North & Robinson Co., Grand Island, Neb.	Mar. 19-20, 1914	11	801.00
Pabst Stock Farm, Ocowomowoc, Wis.	Mar. 10, 1914	17	380.00
J. C. Robinson, Towanda, Ia.	Dec. 17, 1914	18	647.50
Brown & Walker, Clarinda, Ia.	Dec. 17, 1914	8	873.00
Lakewood Percheron Co., Sioux City, Ia.	Feb. 16-17, 1915	32	530.00
Lee Bros., Karneyville, Kans.	Mar. 2, 1915	11	496.00
Sales 17		259	$568.54 Av.

I tabulate Percheon sales alone since this breed is most available, supplies the needs and is most adaptable to our southern conditions.

Well, then just a few words as to the plans. Suppose we want a good Percheon stallion. The constitution and by-laws necessary are not complicated. The first thing to do is to get a group of men together who will work in harmony and who represent from seventy-five to eighty good mares. Organize the association by electing the proper officials, adopting a consti-

tution and by-laws which provide for management of stallion, membership in the organization, disposition of shares, and other necessary arrangements. Then send some member who is a good judge of horses to an auction sale or preferably, perhaps, direct to a breeder of merited horses to purchase the stallion. If the members are not willing to risk their judgment in selecting the stallion, secure expert assistance. For further plans or assistance appeal to the State College of Agriculture, which is always glad to render service to the citizens it represents.

Get busy, begin work NOW before the breeding season opens. And you can see from the tabulated list of sales that they are already beginning. So be the organizer of the plan in your community, bring it before your union or grange. Study its advantages and possibilities, organize your company, secure your stallion, and you will soon be able to watch with pride the marked improvement of the horses of your community and the added progressive spirit of its citizens.



MAZARIN, HEAD OF STATION STUD, KNOXVILLE, TENN.

FRATERNITIES

Elizabeth Wilson, '18

Janathan Higgins, owner of the country grocery, stuck another chunck of wood in the stove, brushed up the ashes, put away all tempting articles of food in sight, and arranged the chairs, barrels and boxes in their usual places around the stove; for it was about time the loafers came straggling in.

When "the bag, the match and the twist," had gone the rounds, Tom Heldon started the morning conversation by remarking: "Say Uncle Hiram, how's that youngest son of yourn gittin' 'long? We ain't heared from him for quite a spell. Must be goin' on nigh a week since you told us 'bout him."

"Wal, boys," drowled Uncle Hiram puffing away in perfect contentment, now that he was launched on his favorite topic, "that there son of mine he shor is a wonder. Hinry an' Joe an' the gals warnt nothin' a long side of him. Why he kin think up more deviltry, get into more trouble, git forgiven more times, eat more pie, drink more cider and spind more money in one day than the hull of 'em put together.

"Now whin he finished High School, he warnt satisfied to settle on the farm with me, like Joe dun. No, nor he warn't satisfied with goin' to the 'cademy in the city like the girls dun, or the State University like Hinry. No siree, Robert he up an' says sezee, 'Pap, I'm a going to Harvard. That's where the big bugs go.' So off he went.

"Afore he started I seys to him, seys I, 'See here Robbie, hits all settled of course, you're agoin' to Harvard, but when you git thar, what perfession air you goin, ter larn?' And he turns and gives me one of them smiles of his'n you all know the one. The one he all'se give you Jonathan, since he's knee high to a duck, when he wanted a stick of horehound. And the one he'd give you Jedge when he wanted to drive yer new mare liggety-split up hill. You all know it, fer he has worked you all. Wal sir, he says, 'Pap, wait 'till I get there and see the lay of the land. Then I'll decide'. So I sells off part of the pasture lot, and Ma and the gals make over their last winter's clothes and off he goes, gay as you please to Harvard.

"But I calculate he's dun decided now. I ain't jest as sure as I might be, how you do it, or what it is persackly, but he's jest gone plum daffy about hit. He calls it 'Fraternity.' That's all he writes about. There's some quare signs he uses to kinder represent hit. He's going to be a Fraternitist, that's settled. He seys that Joe don't know what he missed and that Hinry only got a taste. That there's nothin' like hit. There shore is not fer expense. It's money, money, money. He seys it's the one and only perfession fer a college man, and all the fellers are larning it. If that's the case the world will be as full of Fraternitists as it is of lawyers. But I never did hearn tell of the perfession afore, did you?"

HINTS ON RURAL COOPERATION

R. O. Bates, '18

Rural cooperation has long since become a familiar topic to all farmers who are earnestly endeavoring to advance themselves and their community. Its great economic power has been felt not in a few particular instances, but practically all over the world. It has been found to give fresh courage to many who were giving up in dispair. Whole settlements that previous to its installment had shown a steady decline, when stimulated by this power, took on a new and healthy growth. Particularly is this true of the nations across the waters. Germany alone boasts of more than 26,000 cooperative societies embracing almost every conceivable business, such as buying, selling, providing power, converting produce into marketable shape, storing grain, improving live-stock, insuring farmers against practically every imaginable risk and furnishing credit, etc. In Italy, the advance has become so great that the cooperators are successfully and economically manufacturing their own superphosphates, thus doing away with a "makers' ring." Austria, Russia, France, Switzerland, and, in fact, all of the European nations have, to a greator or less degree, agricultural cooperative organizations. But what, we ask, of our own United States? Here, alas, our own bigness has made for us a stumbling block.

As a nation, we have been unusually prosperous, and especially is this true of our agricultural interests. Apparently we had inexhaustible supplies of forests, minerals, and agricultural wealth, and the thought was not of "conservation," but of "development" and "opening up of the country." There seemed to be something for all, hence none felt the need of others aid. In fact our forefathers so loved their "independence" that they would move when the smoke from a new settler's cabin appeared on their horizon. Thus, we have an inherited independence, which though admirable in its way and of great value at one time, is now one of our worst failings. Having been trained for generations to "do as we please," we find ourselves watching our neighbors with a critical eye; and the thought of consulting with others on points of private business appears exceedingly noxious. We say, "Our fathers fought their battles of life alone, so why cannot we do likewise?" This very independence has caused us to become fickle. When we do organize, it is purely from a dollars and cents standpoint; and if we think that we can do better next year alone, we immediately withdraw our membership, rarely looking into the future to note the disastrous results of such a move. This lack of community spirit and business principle, destroys our organizations as fast as they are formed. Rarely do we find a business that has become a power, which did not at

some period of its existence have its disappointments and perhaps serious losses, yet the promoters had faith and all pushed for a triumphant end. One loss in a rural cooperative society, and its members hastily dig its grave.

Again, a large percent of our rural population are renters, moving about from place to place, and rarely staying long enough in one community to give or receive any benefit. Our country is also made up of many nationalities, and it is hard to get people whose habits, traditions, and customs differ widely, to successfully cooperate. In the Old Country this is not the case, nor is the population so unstable. That "independence" is also of less consequence. Perhaps the greatest incentive for rural cooperation is that dire need of power and financial assistance which the individual farmer is unable to obtain alone.

Few cooperative organizations have been created until the farmers were driven to cooperate. Germany, now the leader in rural cooperation, fifty years ago was at the foot of the rank. But through necessity, she has climbed until she is now setting an example for all the nations of the Globe. The Danes, who are looked upon as models in rural-cooperation, took to it only when Germany refused to buy their corn, thus compelling them to cooperate in the greater financial outlay that a cattle business demanded. Step by step they advanced, only as necessity forced them to. Let us hope that we may become wiser by observation and protect ourselves before necessity compels us. Though every community will doubtless have local difficulties to contend with, the following outlines for various societies might be adopted in a general way. Since every cooperative organization should begin in a very conservative manner, let us first deal with a product that will demand little outlay, financially, at the start, namely marketing eggs.

The cooperative marketing of eggs requires little capital or labor, yet it secures for its members a higher price than could be obtained if the product was sold singly. At one time practically all eggs were sold "case count" at a fixed price regardless of their age, size, color, cleanlines, fertility, etc. However, since the passage of our pure food laws, the candling of eggs at time of purchase has become more and more common. A visit to a wholesale egg plant though, will convince the most optimistic, that there is still room far a great improvement in the condition of the marketable egg. We have made true advance and yet the "blood rings," "seconds" and "spots" still are common to the extent that prices which the country merchant receives, are considerably below that which they might be. The worst feature of this deplorable fact is that the careful producer looses a cent or two on each dozen eggs, while the careless one receives more than his eggs are worth.

The advantages that are gained by the egg society are: first, that there is a discrimination against the purveyor of stale eggs instead of in his favor; and second, that

the egg circle is formed to improve the quality of the product and consequently raise the price. The cost of membership is small probably not exceeding 25 cents per member. Each member is given a rubber stamp which is used in marketing all eggs sold by him. The object of stamping the eggs is simply to determine the date, number of brand of the association, and the serial number of the producer. In this manner it is easy to trace one who is disposing of eggs that are not up to standard. The first offence might be only a fine, while a second might mean expulsion from the organization. The eggs are sold by a manager at a premium above the market price, because the purchasers know that the product is all that is claimed of it.

Some of the requirements and rules are as follows:

1. Eggs gathered twice a day and none of more than eight days age to be delivered to the manager.
2. Eggs to be of uniform size.
3. Eggs to be clean.
4. Eggs to be kept in a cool place.
5. Eggs to be stamped, and no stamped egg, to be sold except through the manager.
6. When put up in cartons, it is usually required that white eggs be separated from brown and the cartons so marked.

In some cooperative socities or circles the eggs are gathered up by the manager and his assistant, but more often the eggs are delivered directly to him. If a cooperative creamery is operating in the community the manager of it might also handle the eggs, as eggs readily combine with the butter business. Seldom difficulty is encountered on this score, the main problem being that of doing something different from the old way.

Cow Testing Association

Here is an example of rural cooperation not for marketing, but for an increase in production. Every farmer knows that cows vary greatly in their production of milk both as to quality and quantity. However, few farmers realize how vast this difference may be in their own herds; nor do many understand sufficiently the details of testing milk for its butter fat content to make quick and satisfactory tests. Hence, the cooperative hiring of a specialist enables a number of farmers to determine, not only their good and bad animals, but also to have a careful record of the herd for the entire year.

The number of members will, of course, vary according to local conditions and the number of cows to be tested, but probably twenty-six would be most satisfactory, as it would allow the tester to visit each member once each month punctually and thus make the data more convenient to examine. The tester would not only determine the production of each individual but also the cost of production, so the farmer could obtain information as to the most economical feeds to use for his particular conditions. Frequently, dairies are producing high yields, but the cost of production overruns the profit. Again, there are so many "boarders" in many herds that,

though the cost of feed is reasonable, these individuals are preventing a good profit from the total product.

Members of the Douglas County (Nebraska) Cow Testing Association sold nearly one hundred of their poorest cows before the first year's records were complete, and others were disposed of soon afterwards. Because of the weeding out process, it was thought that the productive capacity of the average herd belonging to members of this association, was raised at least fifty pounds butter fat per cow as a driect result of the first year's work of this testing.

That milk-testing organizations are highly profitable, is demonstrated by the vast number that are operating in Denmark. The first one was formed in 1895 and in 1911 there were 530. When we stop to reflect that Denmark has less than one-fourth the area of Nebraska, we can better appreciate the above figures.

Though many other instances of vastly larger schemes, in rural cooperation might be sighted, the few suggestions mentioned in this article may, perhaps, give some hints to some who are not in a position to enter upon a cooperative campaign on a larger scale. Let us take each step carefully, and grow as our experience and business grows. Also, let us remember that every one cannot always be pleased all of the time; and when we select a manager or an officer, let us give him a chance, for he will know more about the buying and selling in a few weeks than we could posibly know with our limited time for study. Doubtless there will be many ups and downs, but as a friend once remarked, "The person that solves the marketing question satisfactorily—both to the buyer and the seller, must possess wisdom, patience and insight equal almost to a Solomon."

IS BEEF INCOMPATIBLE WITH MILK

H. B. Drane, '16

The object of this paper is not to minimize the importance of either the dairy or beef breeds. Each has its place, its peculiar place, and one cannot meet the requirements of the other. The dairy breeds will always predominate around the larger towns, cities, and great milk producing centers, and it is only natural and well that they should do so. Likewise, in places that are distant from market, or where labor is scarce, and cheap grazing land is plentiful, perhaps the beef types only should be raised. But the object of this paper is to show that good dual purpose animals exist, and that they have their place in the agriculture of our commonwealth.

It is not difficult to find cows that will give 40 lbs. of milk per day at the flush with 4% or more butter fat, and that will in themselves and their offsprings furnish high-class carcasses. Such cows are termed "Dual Purpose Cows."

While there are many desirable points about the dual purpose animal, it will suffice to name only one or two. Every farmer needs cows that will produce a good flow of milk and at the same time good calves. The dual purpose cow fulfills both of these conditions. The average farmer does generalized rather than specialized farming, and the dual purpose cow fits better into his operations than the highly specialized beef or dairy breeds could possibly do.

Whether or not you get good calves for the butcher often determines success or failure in the dairy business, and always determines it in the beef business. Where the average farmer has only strictly dairy types, he usually conducts his dairying at a loss. Now, if we put the dual purpose type of cows into his hands, the calves alone net him a profit, while he will have all of the milk as an additional gain. Then why, my friend, will you not admit that there is a place for the dual purpose types in the hands of the farmer of average ability.

In order to prove that you can have a cow which will combine in a high degree both beef and dairy characters; that these characters can be fixed; and that one or more dual purpose breeds may be developed by proper care in selection and breeding—the following records are submitted:

Rose of Glenside

Dam—Belle of Glenside; Sire—Bell Boy; Record—World's record dairy Shorthorn Cow, with a year's production of 18,075 lbs. milk, and 735 lbs. butter, and a seventeen years average of 9,417 lbs. milk.

Bessie Butter-Cup

Dam—Rose of Glenside; Sire—Imp. Duke Butter-Cup 160,769. He has 13 daughters with records above 8,000 lbs. milk. Record—11,539 lbs.; average for six consecutive years, 8,966 lbs. milk.

Bell of Glenside

Dam—Margaretta Clay; Sire—Cecil Palmer. Sire had 9 daughters with records above 8,000 lbs. milk. Record—9,186 lbs., with a six year average of 8,239 lbs.

Margaretta Clay

Record—10,043 lbs. with an eight year average of 8,426 lbs.

The records of the above mentioned cows of a direct line prove conclusively that the dual purpose type can be fixed.

Another direct line of high producers is here noted:

Lily Clare 14,930

Dam—Belle Clare; Sire—General Clay 255,920. This sire has 9 daughters with records above 8,000 lbs. Record—8,160 lbs. at 4 years of age.

Belle Clare

Dam—Lady Clare 3rd. Sire—Bell Bay 2nd 162,088. Record—15,215.3 lbs. with 63.5 lbs. as highest daily yield and 1,844.1 lbs. the highest monthly yield.

Lady Clare 3rd

Dam—Lady Clare 2nd. Sire—Henry Clay 112,291. Record—10,103.3.

The above records indicate that there are at the present time, some individuals of the shorthorn breed which have the dual purpose characters well fixed; and considering the way in which the cows in the two lines mentioned inherit-

ed the factor for milk production, it seems that it will be only a matter of time until this type will become more numerous.

Professor James Wilson of the Royal College of Science at Dublin, Ireland, says: "Beef and milk are not inconsistent in the same animal, nor is wedge-shaped shoulders a necessary concomitant of high milk yield." This is a death blow to the idea now prevalent. The "fine points" by which dairymen select their foundation stock may be associated with high yield; yet, **they are not necessarily so.** It might be noticed that high producers are invariably possessors of large capacity for both feed and milk, and that they have excellent constitutions. Now these points—large food capacity and good constitution are just as prominent in beef as in dairy types.

The power to give a high yield is an inheritable factor like color, horns, or other features. Then, let us breed for it in the beef breeds, and begin to associate with these breeds the power to give large amounts of milk. Although there are high-producing cows in all breeds, they are perhaps of more common occurrence in the Shorthorn, the Polled Durhams, and the Red Polls.

A BRIEF HISTORY OF THE SHORTHORN

H. H. Wilson

Origin

Back in the days of old when the Romans, Normans, and others first invaded England, there were in Yorkshire and Lincolnshire and in some of the surrounding shires, two small breeds of cattle. One breed was of a dingy hue and horned, while the other was somewhat larger, and varying in color, with red and white predominating.

With the advent of the invaders, came also new types and breeds of cattle. Large, good milkers, and profitable for the butcher, these foreign cattle, when crossed with the smaller native English breeds, greatly improved them. The improved type which resulted was known in early part of the eighteenth century as the "Teeswater" stock and later as the Shorthorn breed of cattle.

Early Breeders

Very closely connected with the early history of the Shorthorn breed in England are the names of Charles Collins, of Ketton Hall; Robert Collings, of Barmpton Hall; Thomas Bates, of Kirklevington; Thomas Booth, of Killerly; Richard Booth, of Studley Hall; Amos Cruickshank, of Sittyton, Aberdeenshire; and others. Since these men have gone down in history as the greatest of early breeders of cattle, it will be of interest to note something of the work done by them. Their work dates from about 1780, and covers a period of over one hundred years.

By selecting the best individual and by breeding the best to the best, with considerable inbreeding, the Collings brothers succeeded in developing a type of Shorthorn that was a better feeder, that ma-

tured earlier, that had more constitution, and that dressed out with less offal than the old type.

Following in the path that the Collings brothers had paved for him, and using cattle from their herds for his foundation stock, Thomas Bates achieved great success. Like the Collings brothers he believed that the policy of breeding the best to the best was the right one. Bates, however, strove to develop a type of cattle of superior dairy, as well as beef, qualities. He met with success in his endeavor, although his cattle were somewhat criticised for lack of constitution and breeding capacity, due chiefly to excessive inbreeding.

Purchasing some animals from the herds of the Collings brothers and some from his own neighborhood, Thomas Booth established a herd at Killerby in Yorkshire. His method of improvement corresponded to that of the Collings brothers, except that he disregarded milking qualities entirely, and bred for beef form only. With the death of Thomas Booth, the work was taken up and continued by his two sons.

By the first of the nineteenth century the strains of Bates and Booth were predominant in both England and America, but these animals were unable to withstand the hardships of the climate of Scotland. In 1837 Amos Cruickshank, of Sittyton, Aberdeenshire, began to work for the development of a type of shorthorn that would meet the requirements of the Scottish farmer. By selecting cattle that possessed plenty of vigor, constitution, capacity and rapid flesh-producing qualities, he gradually developed a type of shorthorn which was extremely hardy, and which possessed superior beef producing qualities. This type of shorthorn is known as the Scotch, and is today meeting with favor the world over.

The efforts of these famous breeders, together with other contemporary shorthorn improvers, and those who have worked since, have produced both the large, thick, beefy type and the dairy type of shorthorn as we know today.

Importations to America

Although a few shorthorns were brought to America prior to 1817, the first important importation took place at that time when Colonel Lewis Sanders, of Kentucky, imported four bulls and four heifers known as "Seventeens." The progeny of these cattle are also called "the Seventeens."

The results of this importation were so satisfactory that many other men were prompted to make importations. The expense of importing at this time, however, was so great that individuals could not well afford to practice it. This fact led to the formation of a company in Ohio for the purpose of introducing the improved shorthorn breed. Felix Renick and other members of the company visited the famous herds of England in 1834 and chose from them several of the best animals, and brought them to America. The Ohio company made a few more importations subsequent to this;

but from 1840 to 1850 a severe depression occurred, due to a general panic in business. This, however, was merely the clouds before the sunshine; for from 1868 on, the greatest activity in shorthorn history occurred. It was during this period that the New York Mills sale took place.

The Bates cattle were the favored ones at this time, especially the Duchess strain. As a result of this fact, clever spectators gathered together all the cattle of Bates blood and auctioned them off at New York Mills in 1873. Unreasonable prices were paid; the highest, $40,600 and $35,000, being paid for the Duchess 8th, and the Duchess 10th, respectively. The average price on the 109 animals sold was $3,504.

As a sequence of the New York Mills sale and the tremendously high prices, there was naturally a severe depression, and the Bates blood became comparatively worthless. About this time breeders began to be attracted to the Scotch Shorthorns in Canada which had been imported from Amos Cruickshank's herds. This Scotch strain was deep-fleshed, early maturing, and hardy—just what the farmers of the central west wanted. Consequently the Scotch Shorthorn became the favored type of shorthorn, and it continues to hold sway at present.

Famous Families

Bates, the Collings brothers, Cruickshank, and the Booths, founded some very well known and popular families of shorthorns. With Bates originated the following families: Duchess, Wild Eyes, Oxford, Waterloo, Cambridge Rose, Foggathorpe, and others. The Collings brothers founded the families Phoenix, Daisy, Bright Eyes, Red Rose, Princess, Wildair, and others. The Bracelet, Isabella, Moss Rose, Halnaby and other families were the product of Thomas Booth and his sons. Cruickshank established the popular Scotch tribes: Violet, Venus, Minulus, Broadhooks, Victoria, Non Pareil, Orange Blossom, Brawith Bud, Secret, Lavender, Lovely, and a few others.

Characteristics

Every type and breed of cattle is distinguished from others by certain outstanding characteristics. The shorthorn is usually either red, red and white, pure white, or roan in color; but less stress is laid on color, and individuals are now chosen on their merits rather than color.

As a butcher's beast, the shorthorn ranks in the first class, dressing out a high percentage and producing a high class beef. In all the leading fat stock shows, the shorthorn far exceeds all other breeds in numbers, showing it to be the predominating beef breed of cattle. In the show ring, however, the shorthorn steer has not won such marked success as has the Aberdeen Angus.

Early maturing and good feeding ability are two characteristics of the shorthorn not to be overlooked. Also, in grading and crossing the shorthorn is unsurpassed as an improver of grade stock.

In its unrivaled range of adaptability, lies the main strength of the shorthorn. The facility with which it adapts itself to the varied

demands made upon it has won for it a secure place in the affections of the agricultural world—to such an extent that the shorthorn is known as the "farmers' breed of cattle."

The shorthorn is primarily a beef breed of cattle, but within the breed there is a class of cattle which may be called dual purpose cows. They possess a combination of dairy and beef qualities. In milk production this type of shorthorn rises above all other beef breeds.

There is also a polled type of shorthorns, the Polled Durham.

This type corresponds in practically every way with the true shorthorn except in the head variation, the absence of horns. This breed is divided into two classes: (1) the "single standard" Polled Durhams, eligible only to registration in the Polled Durham Herdbook, because of the fact that they are not entirely pure bred animals; and (2) the "double standard" Polled Durham, which are purebred animals and eligable to registration in both the American Shorthorn Herdbook and the Polled Durham Herdbook.

During recent years the "universal intruder," the shorthorn, has proved its excellence under diversified conditions in every section of this country as well as in other countries. No other breed of cattle on earth equals the shorthorns in geographical distribution. All over North America, in South America, especially in Argentina; in Europe; in Australia; and to some extent in South Africa and Asia the shorthorn has found a home.

The men who are doing most for this breed are men of public spirit and purpose, working for the same general end—the raising of the shorthorn to the highest level possible.

Shorthorn sales still maintain the highest average of beef breeds. Prices from $250 to $400 being of common occurrence. At a recent sale of shorthorn bulls in Argentina the usual high level of prices was maintained when the average obtained for 216 head was $2,465. The top price for the champion was $26,250.

In England and Scotland prices have been satisfactory to breeders. An average of $460 was obtained at the Holme Pierreport sale for the females, the top being $1,025.

The high prices in Argentina are easily understood, but the very satisfactory level maintained in Britain under present conditions, is a high tribute to the intrinsic values of good shorthorns.

Comparing with other beef breeds we find the following data with regard to sales taking place from 1904 to 1913 in the United States. In 81 different sales of Aberdeen Angus cattle in which 9,426 animals were disposed of, an average price of $152.88 per head was obtained. The average per head in 219 sales of Hereford cattle, in which 12,359 animals were sold, was $146.69. In 654 sales of shorthorns, 28,396 animals were sold at an average of $157.93 per head.

These figures show plainly that a greater number of shorthorns

are being sold and that the highest prices are being brought by them.

Argentina, which is a great cattle raising country has always imported her shorthorns from Great Britain, but at a recent sale in Wisconsin high prices were paid for shorthorns to be exported to Argentina. This fact shows that the United States is coming to the front as an exporter of shorthorn cattle.

The shorthorn, therefore, is the largest and most popular breed of beef cattle. Over 600,000 animals of this breed have been registered in the United States and many thousands in Canada.

The highest prices for beef animals of any breed are being paid for shorthorns.

The good qualities of this breed of cattle insures for it always a high place in the hearts of farmers and breeders.

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EDITORIAL

Are you a farmer by chance or by choice? Do you really like to get out on frosty mornings and feed your horses, hogs and cows, and watch the warm misty vapors rise from their nostrils? To the true farmer, there is music in the smacking of his hogs over their corn, in the lowing of his herds. He that has not sat upon his feeding lot gate after his days work was over and listened with pleasure at these sounds has failed to get into the spirit of his farm life. To be a real farmer means to love Nature and to love life. The great pleasure of farm life comes largely in the care of these lower forms of life under you; in aiding such forms of that life to grow and increase as will best serve you. There is a certain amount of pleasure derived from growing crops, but a vastly greater amount in the handling and care of animal life. You can go into a farmer's lot, among his hogs, cows or horses and tell very largely whether this farmer has a heart for his business. You do not even have to score the animals to arrive at your conclusion. The very attitude of the animals will largely tell. This is especially true of horses. There is a close relationship grows up between the man who takes a real interest in his farming and has a proper regard for his stock and the stock which he tends. His animals soon learn to interpret rightly his attitude toward them and become gentle or shy accordingly. You may ask is it worth while to win the confidence of your horses and cows? This question can easily be answered in the affirmative from the standpoint of service and safety alone. But, the man who is

indeed a live stock man doesn't assume his considerate attitude from the standpoint of gain alone; but he treats his stock well because he has a proper feeling for them. Such treatment, in fact, all treatment of your animals becomes the index to your fitness for such farming, and points to your success or failure just as it is considerate, or unthoughtful and unfeeling.

Are you a farmer by chance? Do you plow and reap with the seasons, and just because you know of no other way to make a living? If so, then get another job; for this attempted farming is a job to you and not a business. No doubt there are some such, so called farmers still existing. They, however, are fast decreasing. The fellow who lays all his failures to the weather, to an outbreak of cholera, or to bad luck, may be with us until doomsday, but he will have another occupation rather than farming. It is getting more difficult to farm. Brain is demanding a greater and greater share in farm operations, and is balancing up with brawn. Soon the man who cannot think and plan will be dispossessed of his little plat of ground and it will pass to those who know how to use it best.

For several years the Agricultural College of the University of Tennessee has been giving two annual Short Courses for the farmers of the state. One of these Courses comes in summer and deals mostly with the summer problems; while the other course comes in mid-winter and deals with those farming questions which are paramount in winter.

This season the Winter Short Course will be held Jan. 3-Feb. 26. The term will be divided into two parts and two courses will be given during each of these four-week periods. From Jan. 3 to 29, one course will be given in soils and crops, and one in live-stock. Jan. 31-Feb. 26 will be devoted to dairying and truck and fruit growing, with a course in each running through the four weeks. In the course on soils and crops, a study will be made of fertilizers, systems of rotation and general farm management. In the course of live-stock, attention will be given to feeds and feeding, score-card judging and general live-stock judging. In the dairying course, milk production and manipulation, butter and cheese making, feeding and care of dairy cattle and general dairy farming are scheduled for study. The course in truck and fruit growing will include a study of soils and fertilizers for truck and fruit, selection of site and management of orchard.

The object of these courses are to give at first hand to the farmers, information and lessons which will be of a practical benefit in their farming operations. While the Short Course is in session (Jan. 24-29) the Mid-Winter University Fat Stock Show will be held in Temple Hall at the Station Farm. So, the Short Course men will have an opportunity to see and study the best fat live-stock of this section.

The men who conduct these

Short Courses are busy men; and were there no Short Courses would still be busily employed at their regular work in the University. Yet, they feel that they can better serve the immediate needs of the farming interest of the state and of the present farmers by means of personal contact and the giving of lessons to representative farmers from the various sections. The railroads realize the importance of this work not only to the farmer, but also ultimately to themselves and are giving reduced rates to those who attend.

The interest in the Short Courses has been growing since they were first established and promises a still further increased growth. It is hoped that representative farmers from every part of the state will so plan this winter that they may attend this Winter Short Course.

NEWS

Prof. Keffer and Mr. Tate were in St. Louis recently where they attended a meeting of Extension Workers.

H. C. Stockwell, Assistant Dairy Specialist of the Extension Department has had his headquarters changed from Jackson to Knoxville.

During the week of Nov. 8-15th Prof. Keffer was in Sulphur Springs and Jonesboro, where he attended agricultural meetings.

A conference of Rural School Teachers was held at Peabody Institute, Nashville, on November 16, 17 and 18. Prof. Morgan attended, and was one of the speakers.

The seventeenth Conference of the Association of Southern Agricultural Workers was held at Carnegie Library Nov. 10, 11 and 12. About 75 men, mostly Experiment Station directors and men directly in charge of experimental work were present. Several reports were given concerning experiments which the different stations are carrying on. Prof. Moores reported for the Tenn. Station and gave some interesting information concerning legumes, wheat and lime.

One of the main considerations of the Conference was a plan of cooperation among the experiment stations whereby the work of one would not be duplicated by another, located under similar conditions. It was shown that by this method of cooperation much time, energy, and money could be saved.

Prof. Bentley went down to Sweetwater, Tenn., recently to investigate a field of wheat which was infested with Hessian Fly. He found a part of the field which was seeded on the 16th of Oct, was 85% infested. The remainder of the field, seeded Oct. 23 was only 2-3% infested.

Prof. Wilson recently took his

class in advance stock judging up to Johnson Bible College at Kimberlin Heights to look over the herd of Holsteins at that place. The trip was made in a motor truck, and every one enjoyed it very much.

The joint meeting of the agricultural Club and the Home Economics Department on the first Tuesday night in Nov. was a great success. This was the first meeting in which the ladies had taken part and the program was very interesting indeed.

The Agricultural Club now boasts of a vocal quartette, and may have music when it pleases (?). The quartette is composed of Messrs. Watson, Weinegar, Rawlings, and Jacobs.

The usual winter Short Course in Agriculture at the Tennessee Station will be held this year Jan. 3 to Feb. 26, 1916. Four courses will be given; the first in soils and crops, the second in live-stock, the third in dairying, and the fourth in truck and fruit growing. A fat-stock show will be held in connection with the short course Jan. 24-29, in which $1,000 in premiums will be competed for. Any farmer may enter stock in the show.

A carload of 28 steers were received at the farm recently. They are being fattened for the market. About 40 head of cattle, besides the dairy herd, are being fed this winter.

NOTES FROM MISSISSIPPI BUREAU OF EXTENSION

Poultry Pointers

As pullets near maturity give them more room in the roosting quarters.

Feed the pullets and molting hens. Neglect means delay in the egg production.

Plant plenty of green feed for the poultry to graze on in the winter and spring. Experiments show that hens will lay twice as many eggs if allowed to graze. Half an acre for twenty-five hens is none too much. Several acres of wheat, oats, or rye near the house will insure plenty for the whole flock.

Remember that this is the time of year that the young chickens have the sore head. Give them plenty of Epsom salts in their feed or drinking water. If the disease breaks out paint the head, comb, and wattles with iodine and give salts. Separate the well birds from the sick ones.

Two Litters of Pigs a Year Pays The Farmer

A pig census would show that the fall crop of porkers in Mississippi is much larger than heretofore. This is the report of I. W. Carpenter, of the Agricultural and Mechanical College, who has recently made several trips looking after live stock interests of the State.

More farmers, according to Mr. Carpenter, are raising both fall and spring litters of pigs. To do this most profitably many of them are growing their pigs largely on planted pastures. A rotation of these grazing crops furnishes succulent feed the year round.

In the care of your pigs, one of the most important precautions is to keep the sow in a farrowing house provided with a railing to prevent her lying down on the pigs. "The losses of pigs from being crushed to death by the sow," said Mr. Carpenter, "are greater than from any other cause."

As the pigs get all their food from the mother during the first few weeks, proper feeding of the sow is essential to the best growth of the young.

In weaning the pigs when they are eight or ten weeks old, care is necessary to avoid stunting them. If skim milk is available there is usually little trouble at weaning time. Skim milk and corn, or skim milk and shorts in proportion of 3 to 1 is recommended as a feed for weanlings by the U. S. Department of Agriculture. If skim milk cannot be had a mixture of 4 parts corn meal and 5 parts middling, fed as a thin slop; or a slop of middlings alone is recommended by the A. & M. College Extension Department. Green pasture will help the growth and reduce the amount of grain necessary in the ration.

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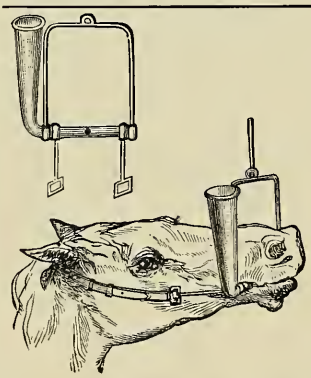

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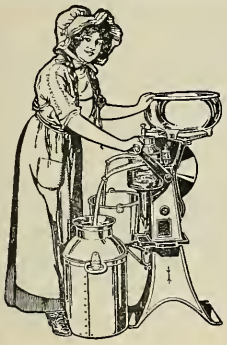

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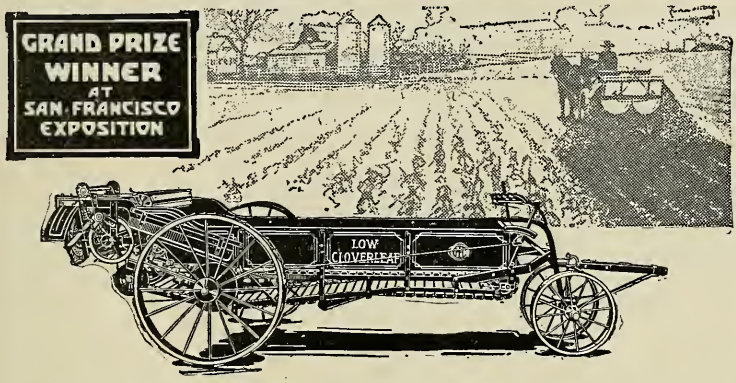

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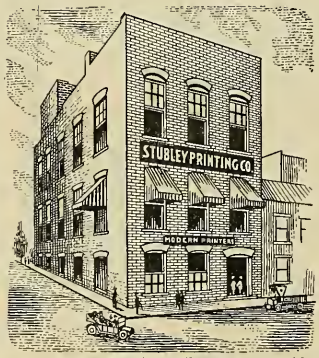

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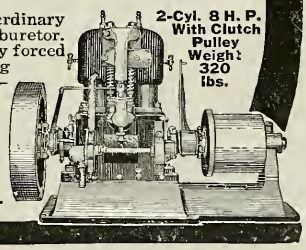

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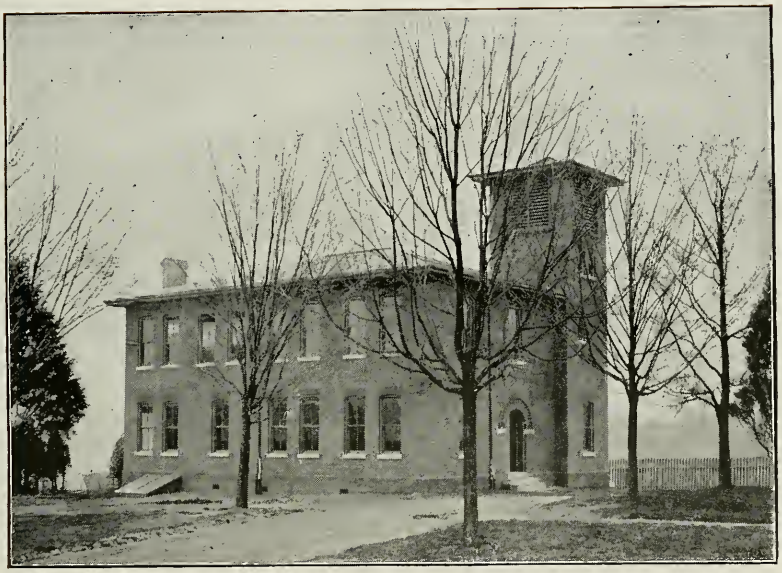
THE U. T. FARMER



STUDENTS CLUB HOUSE AT U. T. STATION

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Contents

The Cold Storage of Fruits ---------- 99
H. J. Fowler, '17

Club Work Worth While ---------- 102
Edw. C. Peters, '16

Our Manure Crop ---------- 105
Maurice E. Barker, Special

A Brief History of the Hereford ---------- 107
J. M. Huffman, '18

Milking As One of the Factors In Milk Production ---------- 110
E. B. Stilz, Special

Effects of Pasturing on Pastures ---------- 112
S. G. Abernathy

Cotton Boll Weevil ---------- 114
John Dail, '16

What Kind of Feeder Cattle Should We Grow? ---------- 117
G. S. McIntosh

Editorial ---------- 119

News ---------- 120

CHEROKEE FARM

THE U. T. FARMER

Vol. X | JANUARY, 1916 | No. 4

THE COLD STORAGE OF FRUITS

H. J. Fowler, '17

The proper function of cold storage is to retard the ripening process of the fruit and the development of decay organisms and skin blemishes. Cold storage is not a remedy nor a restorative for poorly developed fruit, but it is the most effective method of preserving the quality, flavor and appearance possessed by the fruit at the time of picking. It so happens that when a grower has an exceptional harvest he very often finds the market over supplied with the particular fruit which he grows. In nearly all cases in the marketing of late varieties, if the crop be stored for a month or two, it will be carried over the temporary glut of the market. In this state apples, pears, and grapes are well adapted to cold storage, and the preserving of these fruits in this manner should be highly profitable to the grower. This would be especially true for seasons when large yields are produced, for the lower the price of fruit at harvest time the greater will be the profit from storing it.

One year in West Virginia apples were only fifty cents a barrel at harvest time. Those growers who stored their fruit got no less than two dollars per barrel in April, while many barrels brought as high as three and one-half dollars. The great home market that cold storage apples would find in this state would insure just as great a profit as the growers in West Virginia receive from cold storage. In general, fifty per cent increase per barrel can be counted on. In proportion, just as great profits can be had from the cold storage of pears and grapes as can be had from the cold storage of apples in this state.

Assuming that fifty per cent increase per barrel can be had from the cold storage of apples. If a grower or a community were to construct a cold storage plant with a capacity of a thousand barrels, it would, within certain limits, not cost more than $2,500. Allowing ten per cent for shrinkage, 1000 barrels of apples worth $1,500 would return a net profit for storage of 40 per cent or $600 as interest on a $4,000 investment. This would be a 24 per cent interest on $2,500 or the cost of the plant. This is probably as small a crop as one could afford to build a cold storage house for and make it profitable, but houses of increased capacity will bring increased interest on the money invested.

The following experiments were made in Tennessee for the keeping

qualities of apples in cold storage. One crate of Kinnard's Choice was placed in cold storage. After twenty-six days 98 per cent were sound, of bright color, excellent flavor and kept well after being taken out of storage. After 79 days 98 per cent were sound, of bright color, but not excellent flavored, mellow fruit and kept well out of storage. After 148 days 98 per cent were sound, with flavor fair, color dull, mealy and dry and kept well out of storage. After 175 days 95 per cent were sound, some were soft and mealy, and badly off flavor. After 230 days 92 per cent were sound, of badly tainted flavor, very mealy and dry.

One crate of winesaps were placed in storage. After 230 days 95 per cent were sound, of perfect color, good texture, juicy and kept moderately well out of storage.

One barrel of winsaps were placed in storage. After 250 days 90 per cent were sound, somewhat tainted, but juicy and went down rapidly after taken out of storage.

So we see that apples can be preserved in cold storage in marketable condition for a period sufficient to warrant a demand for them on being taken out. Other varieties grown in Tennessee well adapted to cold storage are the Paragon, Commerce, and Ben Davis—the last one being the best keeper of the three.

In this state during late July and early August, when the first grapes ripen, there is a heavy supply of grapes on the market and prices are very low. If the grapes could be stored for three of four weeks, they could be sold at a time when the market is comparatively bare of grapes. The Tennessee Station in this city has made several experiments on the cold storage of grapes, to see if it would be profitable for the growers to preserve their crop in cold storage houses while there is an over supply on the market. It was found that all varieties of grapes placed in cold storage for a period of thirty days were kept in excellent condition in all respects, and held up well after being taken out. This period would be sufficient to carry the grapes over the temporary glut of the market. It was found, however, that the grapes would hold up in good condition for sixty days after which period they went down rapidly.

The profits resulting in cold storage of fruits depends almost entirely on the care taken in storing them. The first step in successful cold storage has been found to be in the practice of such cultural, spraying, and pruning methods as insure production of sound, healthy, well colored fruit free from disease. Assuming this as the first requisite, the following factors have been found to most influence the keeping qualities of the fruit and to furnish best conditions for long storage.

1. Proper maturity at time of picking.

2. Care in all handling operations.

3. Prompt storage after picking.

4. A proper storage temperature and proper humidity.

1. Proper maturity at time of picking. In picking apples for cold storage, they should be gathered when they have attained their full size and are well colored, but before there is any breaking down of the flesh, or mealiness evident. The flesh should be firm and crisp. Storing of the fruit before it is quite mature will tend to cause it to shrivel and lose its flavor, and it does not resist decay as well as if picked later.

Pears should be picked slightly before maturity, but when the stem cleaves easily from the tree.

2. Care in all handling operations. Careless handling is very often the cause of decay of fruit in cold storage. A class of fungi, of which the common blue mould is an example, is known to be unable to attack and cause decay of healthy sound fruit. In spite of this fact, very serious rots, both in storage and in transit, are known to be caused by fungi of this type. In nearly all cases the spores of this fungi are able to penetrate the flesh through bruises or small breaks in the skin due to careless handling. Microscopic bruises or skin breaking is sufficient to afford entrance to the spores of the fungi. Careful handling is very essential for successful cold storage of fruits.

4. Prompt storage after picking. The fruit to be placed in cold storage should always be placed there as quickly as possible after it has been picked. Delay in this respect often causes the fruit to be in poor condition when it is placed in storage and injures its keeping qualities. Early varieties of pears such as the Bartlett, are picked in warm weather; and, as the pear ripens more quickly off the trees, a delay of a few days in storage may cause great injury to the fruit.

5. A proper storage temperature and proper humidity. After a fruit reaches its maturity, certain chemical changes take place which result in over-ripeness, loss of color, and loss of flavor. These changes are independent of decay, but are hindered by low and are hastened by high temperatures. Experience has shown that, as a rule, fruit can be kept best at only a few degrees above freezing. Apples probably keep best at thirty-three degrees Fahrenheit. The grapes experimented with at the Tennessee Station were kept at a temperature of thirty-four to thirty-five degrees. Most fruits keep best in and absence of moisture, and in such cases the air in the storage room should be kept as dry as possible. In many cases the life of the fruit may be lengthened by wrapping.

Where a grower lives near a city probably the best thing for him to do is to place his crop in the city cold storage plant. The city cold storage plant has many advantages: the fruits are on the market all the time; prospective buyers can inspect them without removing them; more uniform temperatures and better ventilation are usually maintained in the city plants. On the other hand, if each community would keep an up-to-date storage plant, their

fruits could be sent to market when there existed a demand for them, and the increased profits thus afforded the growers would more than pay for the expense and trouble of running the plant.

CLUB WORK WORTH WHILE

Edw. C. Peters, '16

Among the recent movements in agricultural education and rural organization none deserve more credit nor give better evidence of future promise than the Club work among the country boys and girls. The first of these to be organized was the Boys' Corn Club which was a part of the late Dr. Seaman A. Knapp's plan for reorganization of southern agriculture. This movement was successful from the beginning since it gave to the boys of the country districts a new incentive in the growing of crops. Wherever Clubs were formed increased acre yields were the result, doubling and in some instances even quadrupling the average of the community and the state.

Leaders in this movement soon realized the necessity of some form of organization for work among country girls but it remained for a rural teacher in the public schools of South Carolina to take the initiative in this direction. She gathered about her the girls of the community in which she was teaching and arganized the first Tomato Club in the world. This was in 1910. Since that time the name has been changed to Canning Club, although tomatoes are still used as the basis of the garden work. The plan is simple and easily understood. Each girl that becomes a member agrees to plant one tenth of an acre in tomatoes and follow the directions given her by the department, both in cultivating the crop and in canning the fruit.

Thus far as an introduction to this paper we have very briefly discussed the organization of Corn and Canning Clubs as a whole, It shall now be our purpose to consider the question from the following standpoints.

(1) The work of the Canning Clubs in Knox County, Tenn., during 1915.

(2) The record of the Club at Young High School.

(3) The success of two members of the Young High School Club.

In treating the subject from these three points of view, we have made use of these concrete instances in order that the clubs and club members in other parts of the state may know what has been done, and while seeking to realize the club motto—"To make the best better," may govern themselves accordingly.

The first Canning Club in Knox County was organized about two and a half years ago. During the past year one hundred and fifty girls were enrolled in the various clubs and seventy-five of this number submitted reports. Fifty-six thousand, six hundred and seventy-three pounds of tomatoes were put up by these girls or an average

of a little more than three hundred seventy-one pounds for each member. Nealy four thousand jars of other products were reported as having been canned. The average cost of production per one tenth acre was four dollars and eighty-five cents, while the average net profit for the same area was twenty-eight dollars. One young lady cleared one hundred and thirty-one dollars from her garden which at the same rate would be more than thirteen hundred dollars per acre—a record of intensive farming scarcely surpassed anywhere.

But it is not this business record (fine as it is) alone, that has made the club work so valuable in Knox County, but rather the wider range of interest that has been made possible through it. For out of this movement have come the winter gardening club, the girls winter

CLUB EXHIBIT OF YOUNG HIGH SCHOOL

extension work, the poultry club, and the millinery class, which meets every Saturday afternoon at the Courthouse in Knoxville. By means of these various agencies the cooperative spirit is being developed which will mean much to the rural communities of the future.

Of all the clubs in Knox County, the one at the Young High School made the best record. This club consisted of five members who remained in the organization throughout the year and submitted reports at the annual rally in November. The members of this group won first prize on their club exhibit, a picture of which appears in this article. In this display were more than one hundred and twenty-five varieties of canned goods. From this it is seen that the members did not confine themselves to preserving the products of their gardens, but when once into the spirit of the work, they increased their canning activities to include many other garden and orchard fruits. Herein lies the commercial advantage of this kind of work. The waste of fruit and vegetables about the average farm home in Tennessee is great enough that if properly conserved would go a long way toward feeding that family during a great part of the year. These girls have learned this lesson and have demonstrated their knowledge not only by the amount of their canned products, but by the great number of varieties as well.

When we examine the roll of this successful club it is not surprising that we should find four-fifths of the membership composed of two sets of sisters. Each group making a world record in the variety of products canned, one preserving one hundred nine different articles, the other one hundred twenty-six. The latter group composed of the Misses Flenniken, cleared about two hundred dollars on their garden besides winning county and state prizes in excess of seventy-five dollars. One of these prizes was a registered Jersey calf, which will give the girls an interest in dairying as well as gardening. The two ladies named are no longed members of the club, but are registered students at the University of Tennessee. But the knowledge which they gained in their two years work in the Canning Club is being made use of by the County Collaborator, Miss Stroud, by having them do deputation or extension work among the girls in other clubs in the county.

For the benefit of the various Canning Club members throughout the state who will be interested in and perhaps helped by the work of these girls, we quote below the complete business record of Miss Mabel Flenniken as given in her report to County Collaborator:

I.—Cost of Production

(a) Rent of land	$1.00
(b) Preparation of tenth acre	.85
(c) Cost of seed and plants	.55
(d) Cost of Manure and fertilizer	.85
(e) Cost of cultivation, staking and pruning	2.03
Total	$5.28

II.—Cost of Canning

(a) Cost of gathering fruit__$1.00

(b) Cost of jars, cans, labels, etc. _____ 3.20

(c) Cost of canning, pickling and preserving _____ 2.50

Total _____$5.20

III.—Garden Receipts

(a) Receipts from fresh vegetables _____$12.55

(b) Estimated value of canned vegetables _____ 68.85

(c) Estimated value of vegetables for home use ____ 16.90

(d) Value of other articles of 1-10 acre _____ 7.20

Total value of all products _____$105.50

Expenses deducted _ 12.98

Net profit for year __$92.52

IV.—Total Yield

Number of pounds of tomatoes from one twentieth acre____806

Number of quarts of other vegetables _____214

The figures given in this report are not fanciful, but are the result of careful compilations made from records kept throughout the summer under the direction of the Extension Department. The author of this paper regrets that space will not permit of extracts from other reports, but in conclusion, desires to extend his thanks to County Collaborator, Miss Stroud, and the members of the Young High School Club for their cooperation and the valuable data which they have furnished.

OUR MANURE CROP

Maurice E. Barker, Special

Yes, we have a manure crop, and it would be worth the small but tidy sum of two billion four hundred million dollars if we exercised reasonable care in handling it. As it is, we allow eight hundred million dollars worth of it to go to waste. We allow the valuable nitrogen to escape back into the air, where there is already a dollar and eighty cents worth over each square inch of our soil. This nitrogen is sorely needed in the soil. There is no excuse for this waste.

The production and handling of the manure crop will take some time and trouble, but I hope to give evidence that the returns will justify the effort. A cow will yield $20 worth of manure in a year; a horse or mule $27; and a sheep $2 worth. Manufacturers get rich when their by-products sell so well. Yet, we farmers sit around and try to run the government while our chances to make the farm pay slip by. It is time we were leaving off such foolishness and try to make some money.

A working horse will void ninety percent of the fertilizing value of the food eaten; a young growing animal will excrete only eighty percent; while a horse neither los-

ing or gaining will pass one hundred percent of the fertilizing value of the food eaten. The dry matter of the excrement is equal to fifty percent of that in the food eaten. The other fifty percent is given off as carbon dioxide. Thus the manure, pound for pound of dry matter, contains more of the fertilizing elements than does the food eaten.

Counting the fertilizing elements at their commercial value, the value of stable manure is $2.92 per ton. Yard manure is worth $1.80 per ton. Thus a loss of $1.12 per ton results from weathering. But the direct value of manure as determined by chemical analysis has little practical value. How much increase in crop production will a ton of manure cause? is the question. At the Ohio Experiment Station it has been found that a ton of stall manure produces a gain of $3.73 per ton, and $2.93 for a ton of yard manure. These returns were far a single crop. When eight tons of stall manure per acre were used on a five year rotation, a profit of $4.69 was realized. The average for yard manure used on all tests where rotation was employed was $2.92 per ton. Furthermore, it was found that larger profits were made per ton where small quantities were used. Hence, we should make the fertilizer cover as much ground as possible.

Many schemes have been employed to increase the fertilizing value of manure. Most of these that have been advertised have been fakes. But our experiment stations have found that the addition of forty pounds of acid phosphate per ton manure will yield several hundred percent on the investment. The addition of the acid phosphate can be best accomplished when the manure is being loaded on the spreader. The cost will be 30 cents per ton for the treatment and the increased gain $1.60 per ton. The addition of the phosphate makes the manure a completly balanced fertilizer. The decomposition of the manure makes the acid phosphate readily available to the plant.

All the fertilizing elements are worth more in barnyard manure than an equal weight of the same element in commercial fertilizers. Some very conclusive evidence of this was given from some unpublished experiments reported at the last convention of the Southern Agricultural Workers. The value of fertilizers is not confined to their plant food entirely; but the bettered physical condition and the increase in the bacterial activities by the addition of manure to soils must be taken into account. In fact, the Georgia Experiment Station gives a great deal of credit to the action of bacteria. We can get an idea of the number introduced into the soil by considering the fact that one gram of fresh cow dung has in it twenty billion bacteria.

Having thus established the value of manure, let us consider the handling of it. The liquid excrement is more valuable, pound for pound, than the solid excrement, although the liquid is devoid of phosphorus. Thus, for economic reasons the liquid must be

saved. By the use of bedding of an absorbent nature this may be accomplished. Or it may be run into pipes and thence into cisterns and applied direct. But this has not proven profitable in America. Peat moss and peat are the most absorbent materials that could be used but these are not accessible. Chopped straw is the best for general uses. Chopped straw is three times as absorbent as whole straw, and the resulting manure is much easier to handle.

To prevent the action of Aerobic bacteria, the manure must be kept moist and compact. When kept in the stall and tramped upon by the animals, very little unfavorable bacteria action results, for all the pores and spaces are filled with carbon dioxide, which inhibits this bacterial work. These particular bacteria liberate ammonia, thus the loss of nitrogen. However another bacterial form, the anoerobic, works under these conditions, rendering the plant food more available. Of course no one is going to let his manure pile take the weather and allow a third of the value to leach away by a few rains.

There is only one best way to put the manure on the ground—that by spreader. The manure is best applied just before breaking a piece of ground.

A BRIEF HISTORY OF THE HEREFORD

J. M. Huffman, '18

The Hereford breed of cattle originated in Herefordshire, England. This country lies among the foothills of the Welsh Mountains. The land varies from rolling to hilly and the grazing is good. It is known that there was in this part of England a type of cattle which probably were the decendants of the aboriginal cattle of England. These cattle were of an exceptionally good beef type. They were used as work animals until six or seven years of age when they were fattened and slaughtered. Comparatively little is known of this early type of cattle, although one early writer speaks of a cattle existing in that section as having a red color, soft fine hair, good head and shoulders, and rather coarse, up-turned horns. It was from this type of cattle that the Hereford breed was developed.

The early improvement of the breed is also somewhat obscure, although it is generally accepted that Lord Scudamore introduced blood from Flanders about 1650. Some claim that a white faced bull from Yorkshire was used on the original cattle. This, however, is discredited as there are no records of a white faced cattle in Yorkshire. It seems more probable that the white Flemish cattle were used. This cross resulted in four classes as to color. In 1845 when the first herd book was published, mottled faced, red with white faces, light grey and dark grey classes were recognized. This variation in color was attributed to the white cattle of Flanders.

Among the early improvers, the Tompkins family holds first

place. The senior Tompkins had an exceptionally good sort of cattle. Among his cattle there was the cow Silver, which later became foundation stock in the herd of his son Benjamin who began breeding about 1742. He did much to establish a better type of beef cattle. In 1769 Benjamin Tompkins, Jr., took up the work and began to breed cattle drawn from his father's herd. It is considered quite likely that he introduced blood from the herds of some of his father's contemporaries. He bred for individual merit, utterly disregarding color. His energy did much to improve the breed and he was the first to bring the breed into public notice.

John Price continued the line of breeding established by the Tompkins family. After securing unsatisfactory results from a bull of another strain, he bought more of the Tompkins stock and continued to use it almost exclusively until his death in 1843. Thus, there was a period of eighty years that the Tompkins stock was bred continuously with no out crosses. The success of such intense in-breeding is due to the fact that five distinct strains existed at the start. Price further improved the Tompkins stock by reducing coarseness of hips, and increasing spring of rib. He also inbred to a considerable extent and did much to bring good points of the Hereford to public notice.

William Hewer became manager of a large stock farm in 1817. This farm later became bankrupt and a large part of the cattle were bought by John Hewer. He selected for vigor, scale and quality and was also a firm inbreeder. He practiced letting out bulls. Most of his cattle were sold to export trade.

Having noticed the improvement of Herefords in England, we turn to America where the breed has made more improvement than it has in England. This is an exceptional case. England has usually produced far superior stock.

So far as actual knowledge is concerned, the first importation was in 1817 when two bulls and two cows were shipped to Henry Clay of Ashland, Ky. One of these bulls was lost on the way. There were reports of earlier importations but nothing definite is known of them. In order to prevent too close in-breeding, Clay's cattle had to be bred to Shorthorns. In this way this importation was lost. It might be added that this tended to make the "seventeens" unpopular. In 1825 a second importation followed. Admiral Coffin of the British Navy presented to the Massachusetts Society for the Promotion of Agriculture a bull and a cow. Other small importations were made although none were permanent. In spite of the separate efforts to establish Herefords in this country, it was not until 1840 that a permanent importation was made. Wm. Henry Sotham and others first brought over five bulls and seventeen cows for Mr. Corning. So well was Corning pleased that he instructed Sotham to purchase for him a ship load. They encountered rough weather. The hatches were closed and the entire shipment was suffocated. Because

of this discouragement and political difficulties which Shorthorn breeders were about to impose upon him, he sold his herd to Mr. Sotham. Sotham made other importations in 1852, 1861, and 1862. Though he made several importations he was financially unable to overcome the opposition which the Shorthorn breeders directed against him, and so he was unable to arouse interest in the Hereford breed. After the close of the Civil War, between the years of 1870 and 1880, C. M. Culburson, W. S. Van Natta, Gudgell and Simpson, T. S. Miller and others became interested in the Hereford.

T. S. Miller was one of the first to take an active part. He was a country boy who had made a fortune in the insurance business and in 1871 he purchased a farm which, through the influence of his manager, he stocked with Herefords. In 1872 he began a fight for Hereford recognition. He began by improving his stock and later fairly pushing them into the show ring. He often exhibited whether or not there was a prize offered. Up to this time one of the greatest faults of the breed was the very poor development of the hind quarters. So striking was this fault that Mr. Gudgells parting instructions to Gov. Simpson, who was starting abroad in the interest of the firm, were, "If you can find a bull with two ends to him, bring him." Anxiety 4th met these requirements, being full and smooth in rump and showed no tendency to droop. He was surely one of the greatest improvers of the breed. Beau Donald 58996, used by W. H. Curtice of Kentucky, was another great improver of the Hereford hind quarters. Coarse up-turned horns were also corrected by Anxiety blood. By selection, sickle hocks have been almost entirely bred out.

The Hereford is a good example of what intelligent breeding can produce. From the earliest Herefords in England up to the present day, the breed has existed in three different types. The heavy shouldered work ox of earlier times was displaced by a more beefy type of animal with heavier hindquarters and better shoulders. The ox became less and less used as a beast of burden. Tallow was wanted, so there was a second type of Hereford. A very good beef type which layed on fat in great patches and rolls. Later the market demanded beef with a better distribution of fat. Thus we have a third type of Hereford with a blocky, beefy body which lays on fat and distributes it through the flesh more uniformly. These changes have been made in the breed in the last eighty or ninety years.

Most of the best breeders are located in the Central States, although some good breeders are found in the East, and recent shows at Atlanta, Ga., indicate that the South is becoming interested in this breed. At the present time the breed is found in greater numbers on the western range. This is due to their hardiness, the good effect of breeding them to western range stock, and to the fact that there is a ready market for the grade calves in the corn belt, where they are used in large

number for production of baby beef.

There are two strains of Polled Herefords. The Single Standard, produced by a cross of Angus bulls on Hereford cows to remove the horns. The origin of the Single Standard is due to Mossum Boyd. He used two Angus bulls each on five Hereford cows. The two polled bulls and two polled cows furnished the start for the Single Standard Polled Herefords. The second class, the Double Standard, were produced mostly by Mossum Boyd, and B. O. Gammon. They found and purchased two polled bulls and by breeding to pure bred Herefords they obtained some polled cattle. This furnished the foundation stock for the Double Standard Polled Herefords.

The Hereford is rapidly gaining in importance. The development of the breed in South America will undoubtedly give the American breeder a good price for his cattle. Already cattle have been purchased for breeding purposes in one of the South American Cattle countries.

MILKING AS ONE OF THE FACTORS IN MILK PRODUCTION

E. B. Stilz, Special

There is quite a lot of agitation in the South among the agricultural leaders and in farm journals in regard to the improvement of dairy stock. There is another factor in milk production, however, which is generally overlooked in discussions about dairying. This factor is the actual work of milking. I believe more cows fail in their milk supply from not being milked properly than from any other one cause. Many farmers hardly get enough from three or four cows to supply their own table with milk and butter mainly because of carelessness in milking.

There are several things which should be observed in milking a cow successfully.

In the first place, it should be done regularly. The cow should know she is to be milked at a certain time so that she may be prepared. Having to wait becomes burdensome to a heavy milker and nature retaliates by decreasing the milk-flow. It would be hard to imagine a champion milk cow being milked at irregular intervals.

Another important point is to get the milk as fast as two hands can do it. If it takes too long to milk the cow loses interest and devotes her attention to something else besides letting down milk. I gave a milking lesson once and it took about half an hour to finish the task. The cow stood and chewed her cud all the while, but she gave only about half the usual amount of milk. I know of no other cause for the small output except the slowness with which she was milked. In the South there is a common method of milking with one hand or rather with two fingers of one hand. The milk is

squirted into a cup, which in turn is emptied into a near-by bucket. In the very nature of things this is a slow process, and a self-respecting cow has the right to feel insulted when it is used on her. It takes away any aspirations she may have had of excelling in milk production. There may be some excuse for using such a method on a cow which is so high up in the hind-quarters that it would be difficult to milk into a bucket on the ground. In such a case a new cow is needed.

The usual objection to milking with both hands is that the cow will step in the bucket or knock it over. This, however, is easily prevented. Squat or sit right under the flank of the cow with the bucket propped against the inside of the right knee and the left knee in front of the cow's right hind foot. If the cow starts to move her right foot, keep hold of the teat with the left hand and reach the bucket with the right. It will be rather uncomfortable walking for the cow, and after a few trials she will be more careful about moving her right foot. Another point along this line is not to let the cow eat grass while she is being milked. A cow can't graze and stand still. Just give her a good slap on the neck every time she makes a motion towards the grass and she will soon quit trying to graze. In a few months you can rattle a bucket near her about milking time and she will back her foot and start to chewing her cud.

Another essential in getting the maximum amount of milk is to have the cow happy and contented. Milk secretion is like digestion in that it is influenced by the emotions. Only when she is perfectly contented she will do her best in the secretion of milk. Pain or fear or any kind of excitement will hinder the functioning of the secretory glands, and cause a lessened milk-flow. It should be noted in this connection that rough language produces fear, and kicking the cow produces pain. Apart from the humane side of the matter they should both be ruled out on account of the effect on the amount of milk produced.

Not only does rough treatment lessen the milk-flow, but it also has a tendency to make the cow mean and unmanageable. A good milk-cow has a highly organized nervous system and will respond quickly to the kind of treatment she receives. I tried to milk a cow once that had been roughly treated and she tried to kick me before I got to her. Although she was a good milker, she had to go to the butcher because of being spoiled by bad treatment.

We ought to consider more what a cow has to stand, especially in fly time. Anyone who has experienced a fly bite through his socks on a rainy evening, can appreciate somewhat how much a cow has to take from these pests. Flies should, as far as possible, be kept from the milch cows.

There is another point which is most important from the stand point of those who use the milk, and that is cleanliness. People get the idea that a strainer will remove all the dirt that may get

into the milk. It is a mistaken idea. Much of the dirt is obsorbed and the finer portion of that which is not absorbed, together with innumerable bacteria, will go through an ordinary cheese cloth. The cow should be kept reasonably clean, and, by all means, the bucket should be clean. It is a good idea to wash the teats with cold water before milking. The purpose of this is two fold—to get them clean and to stimulate the milk-flow. There is no time lost by doing this, because the milk will be ready to come out and can be drawn faster. Another simple expedient is to place the bucket a little out from beneath the udder. In this way very little dirt can get into the milk.

Not the least important requisite in efficient milking is practice. Many a man has put the job off on his wife with the plea that he doesn't know how to milk and can't learn, when the fact is he hasn't tried but a few times. Milking is an art which has to be learned by practice, but a few suggestions, such as I have given, may not be amiss in connection with this art.

EFFECTS OF PASTURING ON PASTURES

S. G. Abernathy

There is an old Dutch adage that runs thus: "more cattle, more manure, and more manure, more grass and more cattle," etc. There seems to be more than just a grain of truth in the adage. Our pastures suffer not from being over grazed, but generally from lack of care and too light grazing. Of course grazing while the ground is soft or before a set of grass is well established often damages the pasture; but, on the other hand, in firm ground even where the grass is thin it will thicken up and improve under heavy grazing. On such lands it is better to reseed the vacant spaces rather than wait for pasturing to fill them up; yet, even after the stand is secured, heavy pasturing will help maintain it in good condition. In substantuation of the above statement, I will give a brief resume of Bulletin No. 204 of the Virginia Agricultural Experiment Station on "The Management of Blue Grass Pastures."

The experiments and results cited below were given out after they had been conducted by the Virginia Station in cooperation with U. S. Department of Agriculture. These experiments were made at Blacksburg, Montgomery County, Virginia, on soils of a limestone origin and located at an elevation of 2100 feet, in a section naturally adapted to bluegrass. In fact, the pastures had been standing 12 years, unbroken, previous to the beginning of the experiments.

At the outset of the work the 20 A. pasture field used was surveyed and divided into eight 2½ A. plots, similarly arranged and with uniform conditions of watering and gates, etc. The plots were grazed to sheep the first year,

(1908) then cattle were substituted and run for the remaining four years,—two year old steers were used i n1909 and yearlings thereafter. The results of 1911 were omitted because of lack of uniformity in conditions, and the vitiated results obtained.

The treatment of the fields were as follows:

Field No. 1 was disked once each spring with an ordinary single-acting disk harrow, set so as to penetrate two to three inches, but not turn or tear the sod very much.

Field No. 2 was untreated and used as a check on No. 1.

Field No. 3 was harrowed with a spiked-tooth drag once each spring.

Field No. 4 was untreated and used as a check on No. 3. The first group of animals were kept on Plot No. 1 for ten days then put on Plot No. 2 for ten days, then back on No. 1 again, etc.; while the second group were changed back and forth on Plots No. 3 and No. 4 in like manner.

Field No. 5 was both disked and harrowed.

Field No. 6 was untreated and used as a check for No. 5. The group of animals for these fields was changed at intervals of twenty days back and forth from No. 5 to No. 6.

Field Nos. 7 and 8 were given no mechanical treatment and were grazed continuously throughout the summer. Field No. 7 was grazed twice and one summer three times as heavily as field No. 8.

From each of these eight fields 1-50 A. plots were fenced off, the grass cut, and both green and cured weights of the amounts produced recorded.

So, these experiments tested several phases of pasture management.

First we have the results of alternate and of contiuous grazing under similar conditions. The average gain per field where 3 animals were grazed alternately was 1,171 lbs. The average gain per field where 2 animals were grazed on one of the fields and one on the other field continuously was 1,161.5 lbs. The difference is only 10.5 lbs. and this small gain in favor of alternate grazing really means nothing as it is within the limit of error and may have resulted from some other factor.

Secondly, we have the results of cultural treatment of these plots or fields, expressed likewise in gains. The results which are about as inconclusive as the above, are in total as follows:

Total Gains for 1909, 1910 and 1912

Group 1—
Field No. 1 (disked) ___1,175 lbs
Field No. 2 (untreated) 1,213 lbs

Group 2—
Field No. 3 (harrowed) _1,121 lbs
Field No. 4 (untreated) 1,041 lbs

Group 3—
Field No. 5 (harrowed and disked) _____1,080 lbs
Field No. 6 (untreated) 1,259 lbs

On the strength of these figures, cultural treatment of pastures is not recommended by the Virginia Station.

The cuttings from the 1-50 A. plots also showed no advantage resulting from cultivation.

Furthermore, the test covered light and heavy grazing. The total gains for field No. 7, when continuously grazed for three years by 2 animals per season, are reported as 1,485 lbs. The total gains for field No. 8, where one animal per season was continuously grazed, are reported as 838 lbs. This shows very decidedly in favor of heavy grazing from the standpoint of gains per field. But there was also given another advantage of heavy grazing. Field No. 7 retained an even sod and was kept free from weeds; while field No. 8, which was lightly pastured soon changed from a bluegrass-red top sod to a heavy coat of weeds, briars and brown sedge. During the last year of the experiments as reported the managements of Fields No. 7 and No. 8 were reversed or interchanged. Already the conditions of field No. 8 are improving; and in field No. 7, weeds and brown sedge are making their appearance.

Thus, of all these experiments, the only conclusive results obtained were those favoring heavy grazing over light grazing. The other phases of the experiments may tend to arouse interest in the study and care of pastures and thus prove an indirect if not a direct benefit.

COTTON BOLL WEEVIL

John Dail, '16

The boll weevil is not native to the United States. Its origin was in the plateau region of Mexico, or in Central America. This same region is also the original home of the cotton plant. Little is known of the boll weevil previous to 1892, when it crossed the Rio Grande and entered Texas, perhaps in seed that were carried over. The growing of cotton, however, had been abandoned in some parts of Mexico previous to 1892, because of the damage done by the boll weevil. In two years after the weevil was first noticed in Texas it had spread to six counties. The Bureau of Entomology was notified, and a preliminary study by Dr. Howard and Mr. Townsend showed the importance of immediate action.

Since entering Texas the boll weevil has spread very rapidly, ranging from 40 to 70 miles a year. In 10 years it spread over 56,400 square miles, or an average of 5,640 sq. miles per year. Since 1901 it has spread over on average of 26,880 square miles per year. In 1904 alone it spread over 51,500 square miles. Today at least eight states are partially infested. They are Texas, Louisiana, Alabama, Georgia, Mississippi, Arkansas, and Oklahoma. A few weevils have been taken in three counties of Tennessee. The weevil was not in Tennessee until the fall of 1915 when it was noticed in Hardin, Hardeman, and Shelby Counties.

The damages done by the weevil vary, of course, from season to season, and also in different areas. The heavier the rainfall and the milder the winter the greater are the damages. It is estimated that

in Texas $2.25 per acre annually was lost through the ravages of the weevil from 1902-1907. The average acreage was 10,000,000 making a loss for the state of about $22,500,000. It can be seen from these figures how great a factor the weevil is.

Damages are greater after a moist winter, where shelter for hibernation is best. For this reason the methods of control work better in Texas, where the rainfall is about 40 inches, but with the springs usually dry. In other states, where the rainfall is heavier and the winter milder, control methods do not work so well. As new regions become infested new methods to some extent must be worked out for them. The problem is a serious one, but there is no occasion to lose hope.

The adult weevil is small, being only about ¼ inch long. This length includes the snout, which is about ½ the length of the body. The size varies often, according to the amount of food procured during the larval or growing stage. Just after emerging the beetle is bright yellowish in color, but passes to gray or near black in a few weeks time.

There are many other weevils which resemble this one and are often mistaken for it. Reports have often been sent in from non-infested areas to the effect that weevils have been found, but in most cases it was only a weevil which resembled the boll weevil. The boll weevil can be distinguished by little double-toothed projections on the femur of the leg. The surest way, however, is to send a specimen to an entomologist. Falling of squares is an indication of the presence of the weevil, but this may also be caused by unfavorable weather conditions. The weevil works during the daytime only, and is not attracted to lights as is sometimes believed. One of its most interesting characteristics is that of "sulling." When disturbed it drops to the ground and appears to be dead, but moves on again when everything is qniet. This fact is made use of in the control methods.

The weevil passes the winter in the adult stage. Immature stages at the time of frost are usually killed. The adult stages seek protection at this time. They fly into hedges, woods, straw fields, hay stacks, or any place where there is sufficient cover to protect them during the winter. Many hibernate in the cotton field under grass, weeds, old cotton bolls, or any kind of trash. They usually take no food during winter, but remain dormant. They may, however, move about some on warm sunny days.

The number living over winter depends on conditions. Sometimes as high as 12 or 15% successfully pass the winter, but under normal conditions usually not more than 3%. One pair of weevils, however, may produce 12,755,100 offsprings in one season, so if only 3% do pass the winter the problem is still a big one.

There are many methods used in control of the weevil. Spraying with any kind of poisons has not been of much value because the larva or grub goes to the inside of

the boll and is not reached by the spray. Spraying just at the time the eggs hatch would, of course, destroy some of the larva, but they are not killed in large enough numbers for this to be profitable.

There are about 45 species of natural enemy to the boll weevil. About 23 of these place their eggs in immature or larval stages of the weevil, and the larva from this egg then destroys the larva of the boll weevil. Some seasons as many as 50% of the larva are destroyed by these parasites.

Heat is another destroyer of the cotton boll weevil larvae. For this reason, rows are planted wide apart, and a narrow leaf variety of cotton used. A chain cultivator is also used in cultivation. This implement serves two purposes—it cultivates the soil and at the same time drags the fallen squares to the center of the row. The sun then gets a fair chance, and most of the young weevils in these squares are killed by the heat. When the temperature is 90 degrees F. in the shade it is 120 degrees F. on the ground and in the sun. Thus it is easy to see why the larvae are killed when the squares are rolled where the sun can strike them. Most cotton farmers understand the working of the chain cultivator.

Crop rotation is another factor in controlling the weevil. It is a fact that on land where cotton follows some other crop the damage is not so great. This is explained by the fact that in the spring the weevil never flies very far after it comes out of its hibernating quarters. If cotton followed cotton the weevil would be right there, and nothing to do but start his work. A rotation results in cleaner cultural methods, and this also aids in the control of the weevil.

There are other methods of prevention and control which may be summarized briefly as follows:

1. Destroy the adults which are about to hibernate in the cotton field in the fall either by burning the stalks, or turning then in deep. It is not good practice, however, to burn the stalks, since humus is so badly needed in the South. Better rotate and turn deep.

2. Destroy other weevils by destroying rubbish and weeds along fences.

3. Prepare land early, fertilize, and plant early, using early varieties.

4. Cultivate early and often, and thin to a stand early so as to get a rapid growth.

5. Do not buy expensive poison preparations for destroying the weevil.

WHAT KIND OF FEEDER CATTLE SHOULD WE GROW?

G. S. McIntosh

The average live-stock farmer usually has his herd of feeders, and in addition one or more milch cows, the calves of which he likewise feeds for the market. Too often these feeders have been indiscriminately picked up throughout the community and are predominantly scrubby and hard to secure. But the time is here when this farmer knows that it will be more economical for him to raise his calves. The questions that now confronts him are; the selecting of his sire; the proper weeding out of inferior cows; and the skillful grading up of his herd, even to the utilizing of the offsprings of his milkers. It is the object of the following paper to touch upon some of the major factors to be considered in order to secure the above mentioned results.

In growing cattle for meat production the selection of a bull to head the herd is of greatest importance. As a breeder of feeding cattle one cannot afford to use a common bull of indiscriminate breeding, since you can obtain from fifteen to twenty dollars a head more for cattle that are well bred and possess quality enough to weigh 1,000 pounds at two years of age, than can be obtained for those which show no breeding and possess little or no quality and frequently are three years old or older when they weigh 1,000 pounds. Of course the bull is not altogether the fault. Inferior cows crossed with an inferior bull seldom produce steers or any merit, but these same cows crossed with a well-bred beef bull will produce calves which, when marketed, will bring from one half cents to a cent higher price per pound. This in a 1,000 pound steer amounts to from five to ten dollars each, not considering the fact that they will reach 1,000 pounds weight at least a year sooner than those sired by scrub bulls. A bull properly cared for should sire at least fifty calves per year. At the lowest estimate of a five dollars increase in value of offspring, the profits for one year would amount to two hundred and fifty dollars. There are plenty of registered beef bulls of the various breds which will sire fancy feeding cattle, that can be bought for from $150 to $250. Thus a registered bull will pay for itself in one year.

In selecting the bull buy one of that breed of beef cattle which predominates in your locality. It is generally a matter of personal preference whether one choose Hereford, Shorthorn or Aberdeen-Angus, and personal opinions should be sacrificed when the good of the community is at stake. A high grade bull of either of these breeds will prove satisfactory. The bull selected should be pure-bred, and his ancestry should be of the best. If the ancertors are prepotent, show records of having produced stock of high quality, and the bull in question shows a high standard of individual excellence,

it is only natural to assume that the same characterists will be concentrated in the immediate progeny. A good sire for feeders should have a body that is long, wide, deep, and low set. The back should be broad, thus designating the shape and turn of the ribs, these should be square and extend low to give depth to the body. A broad loin, smooth, well developed quarters, low flank, smooth neck and forequarters should be assured. A head that is long, broad and clearly outlined with a large muzzle is also necessary. A strong constitution is all important since it is one of the attributes which must be possessed to produce strong, healthy and thrifty individuals. A lymphatic nervous temperment is essential so as to increase meat storing processes. Good quality is an important point; for steers possessing quality bring a higher price on the market. A bull must also possess masculinity. In selecting the bull do not sacrifice pedigree for individual excellence, nor vice versa. To obtain results it is generally necessary for the bull to possess both.

Not only should a good bull be obtained, but great care should also be taken in the selection of cows. Good steers often result from mating common cows with a well bred bull, but better ones are secured from well bred cows. The breeders will find it profitable to use high grade cows of some one of the beef breeds or dual purpose breds. Scrub breed owners may accomplish this either by selling their common stock and buying high-grade cattle, or by grading up the cows on hand by successive crosses of meritorious beef bulls. But do not ignore dual-purpose types of cattle. Many cows exist on the farms of the South as grades of mixed lineage but usually showing the predominence of Shorthorn blood. There are also some excellent representatives among Red Polled and Durham types. The dual-purpose cow has been for some time past and will likely be for a long time in the future, a great factor in the beef producing industry of the United States. In my mind I feel assured that a class of dual-purpose cows can be secured which will produce a milk flow ample enough to throw them in the profitable dairy class and at the same time, when bred to good beef bulls will produce steers that, when fattened will produce a high grade of beef. In selecting beef cows have in mind the following considerations as to form, breadth, and general smoothness of body, good top and under line, full flanks, short and straight legs. The bone, head and hair should indicate quality as opposed to coarseness on the one, hand or delicacy on the other. A good constitution, evidenced by a broad, deep chest, a good heart girth and a finely conditioned hair.

By crossing such a bull as described above with the cows mentioned, choice feeders will be the result; and these, when put on the market, bring, today, from 9¼ to 10½ cents per pound, while common steers will seldom bring more than 7 or 8 cents. From these prices the value of well bred steers is easily recognized.

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EDITORIAL

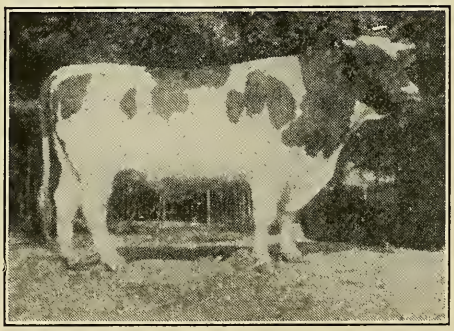
In an article by Mr. Dail in this issue of the U. T. Farmer, attention is called to the fact that the boll weevil has entered three counties of West Tennessee. It is well enough that this unwelcome visitor has been located and given notoriety, but there is no occasion for serious alarm. It is hardly probable that the weevil will do serious damage to the cotton interests of this state for years to come. Tennessee is about its northern limit. It cannot withstand the rigors of a severe Tennessee winter. When the thermometer gets down to 10 degrees Fahrenheit most, in fact, practically all of these little fellows die out, and zero weather for a day or two will kill them all. So these weevils may be in the state in September, and no trace be found of it the following spring. Of course they will enter again and again, and forms may finally adjust themselves to this latitude; but this will not likely occur within the course of a year or two, nor likely in a dozen years. So, there is no necessity for over excitement nor abandonment of farms by farmers because of this invasion. On the other hand, we should not sleep on our oars. Care and prudence should characterize our farming operations. The methods of control advocated should be followed where the weevil exists and the battle fought and won while the enemy is weak and vulnerable.

Our state has a right to feel proud of its 1915 corn crop. Yet, the farmers have not come to their own in corn production. Why should Tennessee stand 11th in the list of corn producting states,

when it has so many factors in its favor? The fact that the total yield is low does not mean so much against us, since farming here is highly diversified. It is the acre yield that needs our attention. Let us compare our conditions and our corn production with that of some of the corn states. Iowa produced 389,424,000 bushels of corn in 1914. The average acre yield was 34.9 bu. Indiana grew in the same year 163,317,000 bu., and got an acre yield of 37.1 bu. Ohio produced 142,715,000 bu. and her acre yield was 38.8 bu. Tennessee produced 80,400,000 bu., with an acre yield of 24.9 bu. Why this 13.9 bu. acre yield of Ohio over our state? Wherein lies the trouble? There are three limiting factors in corn production—soil fertility, length of growing season, and rainfall. In length of growing season, Tennessee has about 185 days against 150 days in Iowa, 160 in Ohio, and 165 in Indiana. In point of rainfall, Tennessee compares very favorably with the above mentioned states. In 1915 the July and August rainfall of Tennessee was 11.77 inches. In Iowa it was 12.13 inches, and in Ohio 10.84 inches. The mean summer temperature for Tennessee is higher than in either of these states, which is another point in our favor. Shall we say the trouble lies in our soils? No, the trouble lies largely with us in our management of these soils. We have varied soils in this state. Soils with great possibilities for production. But these soils must be rightly handled and cared for before they will give their full response. With so many factors in our favor, and the opportunity ours to make the others even, it seems almost a reflection upon us Tennessee corn growers to let these northern states so outstrip us in acre corn yields.

NEWS

The West Tennessee Station has recently suffered another serious loss from their herds. Johanna Korndyke De Kol I, the bull which headed the Holstein herd died suddenly at the Station. He was apparently well in the evening before being found dead the next morn-



JOHANNA KORNDYKE DE KOL I

ing. Of course his mirits as a sire had not been thoroughly tested, but he gave promise of good results. His dam has a record of 29 pounds of butter in 7 days, and he was an individual of good size, type, and strong masculinity.

Dean Morgan and Professor Watts and Bentley spent the last week of 1914 in Columbus, Ohio, attending the National Organization for the Advancement of Science.

Miss Geneva Conway of Cincinnati, Ohio, has been appointed specialist in Home Economics with headquarters with the Division of Extension at Knoxville. She began work January 1, 1916.

Mr. H. E. Baker has been appointed assistant dairy specialist, to work in Blount, Sevier, Union, and Jefferson Counties. He will assist the dairy interests of these counties and will be in the field for four months.

Mr. McAmis spent his holidays in West Tennessee.

Mr. R. M. Murphy spent the last days of December visiting the demonstration farms of the Nashville, Chattanooga and St. Louis Railroad in charge of Mr. Judd, attending live-stock meetings and looking over the bulls to be distributed to the farmers.

Mr. C. A. Hutton has recently organized a Corn Testing Association in Jefferson and Hamblen Counties.

Mr. John Titsworth was seen on the Hill during the latter part of the Holidays. He was of the 1913 class and is now teaching in the Brownsville High School.

Messrs. Penn Worden and K. A. Neely were also visiting their Alma Mater Christmas. Mr. Neely is County Agent and Mr. Warden is connected with the N. C. & St. L. demonstration farms.

Mr. James Robertson, '15, spent Christmas with his mother, brothers and sisters out at the Station Farm.

The trees and stumps have been removed from the Horticultural Division of Cherokee Farm and the land turned and ready for the beginning of experimental work.

Correspondence indicates that the Short Course will have the biggest attendance in its history. The classes will be held in the basement of Morril Hall. This will enable students to attend lectures of special interest to them. The entire program for the Short Course was published in the preceeding issue of the U. T. Farmer.

On January 24, 1916, there will he held a convention of state associations in Nashville. The State Florist Association will be in session on January 24, followed by the State Horticultural Society on the 25th, the Nurseryman's Association on the 26th, and the Bee-Keepers' Association on the

27th. Leading men from within and without the state will address the convention, among whom are Prof. O. M. Watson; Mr. Schoenfeld, Specialist in Marketing Division of State Division of Extension; Prof. G. M. Bentley, State Entomologist, and Prof. Chas. A. Keffer, Director of the State Division of Extension. Tuesday evening of January 24 will be devoted to the bed rock principles of organization lead by Mr. Schoenfeld. Lantern slides will be given illustrating the advantages of cooperative organizations, which are at present in operation in the state of Washington.

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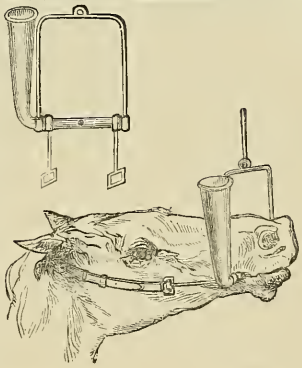

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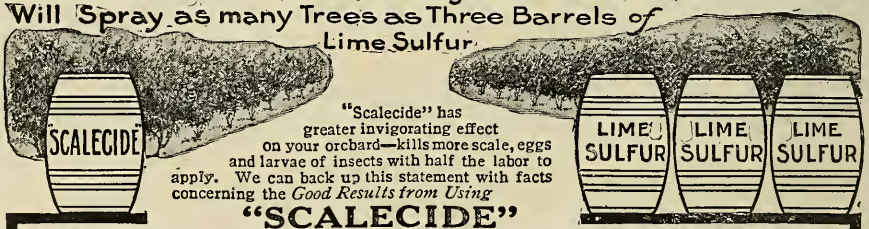

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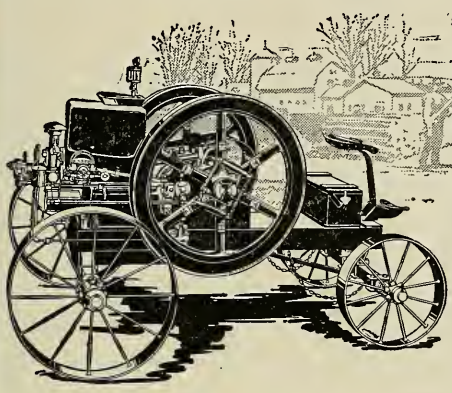

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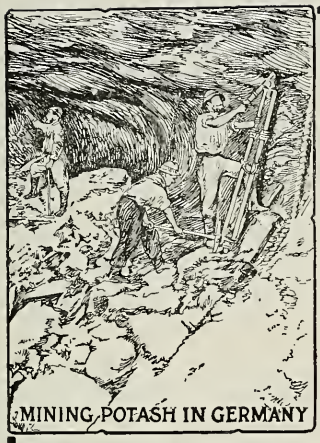
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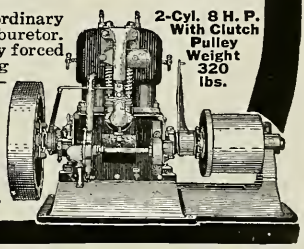

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Vol. X FEBRUARY, 1916 No. 5

Published Monthly By

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Contents

Tennessee's First Cow-Testing Association ---------- 131
By C. A. Hutton, '13

Extension Work at the University ---------- 133
Miss Margaret Conover

The Hot-Bed and Cold-Frame ---------- 138
B. McSpadden, '17

Cotton-Seed Hulls as a Dairy Feed ---------- 140
C. M. Hume

The Influence of Protein on Milk Production ---------- 141
Frank S. Harkleroad, '14

The Selection and Planting of Fruit Trees ---------- 145
Leonard J. Kerr, '18

Obtaining A Market for the Farmers' Butter ---------- 147
H. E. Baker

Editorial ---------- 150

News ---------- 152

FARMERS VISITING THE WEST TENNESSEE STATION FARM

THE U. T. FARMER

Vol. X | FEBRUARY, 1916 | No. 5

TENNESSEE'S FIRST COW-TESTING ASSOCIATION

By C. A. Hutton, '13
Dairy Specialist, Division of Extension in Cooperation With
Dairy Division, U. S. Dept. of Agriculture

Progressive, thinking dairymen have long realized the importance of using business methods in the operation of their dairy farms. They know full well the necessity of keeping systematic herd records if one would know his cows and make money from them. About one-third of all the dairy cows in the United States are kept at a loss; about one-third break even; leaving only about one-third that are kept at a profit. Dairy farming is one of the most complex and highly specialized types of farming; and to manage a dairy farm successfully, requires more business ability than is needed for any other system of farming.

Twenty-five of the most progressive dairy farmers of Jefferson and Hamblen Counties realized these facts so seriously that they were led to form themselves into a cooperative cow-testing association for the explicit purpose of putting their dairy farming operations on a business basis. At a meeting held in Morristown, Dec. 18, the association was perfected with twenty-five members, owning a total of 401 cows. The Jefferson-Hamblen Cow Testing Association is the direct result of some herd record work started years ago by representatives of the Dairy Division, U. S. Dept. of Agriculture, and followed up during the past three years by the writer. This is the first cow-testing association in Tennessee, and the only one in operation in the South.

The plan of organization is simple. Each member signs a contract agreeing to pay the association $1.50 per year for the keeping of records on the number of cows in his herd. A competent man having an agricultural college training, with special knowledge of feeding and dairy management, is employed by the board of directors, to visit each herd once per month, make tests, and work out the records of production for each cow, together with a record of feed consumed and net profit or loss per cow. After a very extended search by the writer, we finally located a man for the position of tester, who has had very special training for this work,—H. J. Childress, of Jellico, Tennessee, who for the past two years has been a student at Kentucky State College of Agriculture, during which time he has kept the herd records at the Elmdorf Dairy, the largest dairy in the South.

NUMBER OF COOPERATIVE COW-TESTING ASSOCIATIONS IN THE UNITED STATES

In Operation on July 1, Each Year

Number of Associations in Operation

States	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915
Michigan	1	4	2	5	4	3	4	4	3	3
Maine			3	4	3	6	5	4	5	8
New York			1	1	3	9	18	21	29	35
Vermont				2	8	10	11	17	28	33
Iowa				2	5	4	8	7	8	13
California				1	3	2	4	4	5	7
Wisconsin				9	10	10	8	11	24	37
Nebraska				1	0	0	0	3	2	3
Colorado					1	1	2	1	1	0
Pennsylvania					1	1	2	2	7	14
Ohio					1	0	0	1	4	5
Maryland					0	1	3	3	2	4
Illinois					0	4	3	2	7	3
Washington					1	3	1	0	0	1
Minnesota						3	7	10	9	11
New Hampshire						1	1	1	4	8
Oregon						1	1	1	7	11
Utah						1	0	0	1	1
Massachusetts						2	2	2	3	0
Virginia						2	2	2	0	0
Kansas								1	1	1
Indiana								2	2	3
Kentucky								1	1	0
Missouri									2	1
New Jersey									1	1
West Virginia									1	1
Connecticut									1	3
North Carolina									2	0
Louisiana									1	0
South Dakota									1	1
Nevada										1
Total	1	4	6	25	40	64	62	100	163	211

All details of organization were completed and the tester began actual operation on Jan. 5, 1916. He carries with him a specially constructed 12 bottle testing outfit, milk scales, sample bottles, etc. The Dairy Division furnished all the necessary herd record books and blanks, and sent a representative to aid in forming the association and to assist in starting the work of testing.

Already the tester has visited about eighteen of the herds, and the owners are all enthusiastic over the work. The actual figures showing the profit or loss from each cow are eye openers, and the dairymen are "sitting up and taking notice." They are beginning to see their cows as they never saw them before, and things are taking on a new aspect.

The cow testing association movement is not new in the North. It was first practiced in Denmark in 1896, and was introduced into this country in 1905, when the first association was formed in Michigan. From that association, the movement has gradually spread to other sections, and each year has seen a steady, healthy growth, as will be seen from the table. It is interesting to note how new states have taken up this work each year, and how the number of associations have increased in most of the states from year to year.

While the weeding out of the unprofitable cows and the use of better rations for more economical milk production, through the keeping of systematic herd records, is the principle object of the association, this is not the only benefit to be derived from such an organization. Meetings are held at regular intervals, and various problems of vital interest are discussed. These meetings help to bring the members together, and foster a better social spirit. Members can buy feed cooperatively and in this way effect quite a saving. The records enables one to tell from which cows to raise heifer calves for future cows. The association fosters a spirit of friendly rivalry between the members, and puts the dairy operations on a business basis, thus enabling the men keeping cows to realize greater profits. It also helps to do away with the drudgery connected with dairying.

The members of the Jefferson-Hamblen Cow-Testing Association are a real, live, progressive, group of dairy farmers, and the success of this association will be watched with keen interest. The writer is much gratified with the results accomplished so far, and wishes to congratulate the members on standing by him in this movement, and on being members of the first cow-testing association in Tennessee. Undoubtedly others will follow.

EXTENSION WORK AT THE UNIVERSITY

Miss Margaret Conover

The idea of the purpose and scope of a university is continually enlarging. We feel now that the efforts of a state university

should not be limited to benefiting merely the students who are enrolled. The University of Tennessee has been accomplishing much outside the class rooms. Its field work is classified under three main heads: the work of the Agricultural Department, including that done by the Division of Extension and that of the Experiment Station forces; the Engineering Extension Courses; and the work in Secondary Education. Other lines of work are also conducted, but only these three will be treated in this article.

The Division of Extension of the Department of Agriculture was organized July 1, 1914, and operates under the provision of the Smith-Lever Bill. "The colleges of agriculture of the states receive annually $10,000 each from the United States Treasury, and an additional sum prorated to the rural population of the several states provided there is raised within the state a sum equal to that supplied by the National Government. This additional appropriation is to begin in 1915, is to increase gradually for seven years. When the maximum is reached it will continue as an anual appropriation. Under this arrangement the College of Agriculture of the University of Tennessee will receive approximately $32,000 in 1915, the sum increasing until $150,000 is reached in 1922. To receive the additional sum above the $10,000 a year, the State must provide an equal amount." This extension work is in charge of Director Keffer with assistant directors, specialists, district and county agents and a clerical force.

Demonstration work is carried on over the whole State, including work for both men and women. In the work for men, there are 37 county agents working in 36 counties. These agents have under their charge about 40 farmers each. These farmers agree to work a certain number of acres according to instructions. These agents who are for the most part graduates from agricultural colleges, are working under Director Keffer's plans and in touch with the University. They hold agricultural meetings in their respective counties, where questions of vital interest to the farmers are discussed.

There are 8 specialists in Knoxville: one in poultry; two in dairying; two in animal husbandry; one in agronomy; one in marketing and rural organizations; and one in home economics. These specialists work in connection with the county agents and hold agricultural meetings and help conduct short courses over the state.

Before a short course will be given in a community a guaranty fund must be raised by the community to cover expenses. This is usually subscribed by the merchants, farmers, bankers, etc. of that section. These courses run for a week and cover the various lines of agricultural work of interest and worth to these farmers. In these courses the professors of the University cooperate with the specialists. In 1914-1915, 19 courses were held with a total attendance of 1,611. The number of

farm demonstrations under the agents are reported as 2,500.

The Boys Corn Club work is now under the supervision of the county agents. There are clubs in 33 counties with an enrollment of 1,342 members. Last year there were 519 field meetings held out on the farms, and 541 public meetings held in towns. The total attendance at these meetings was 83,319.

The work for women and girls is under the direction of Miss Virginia P. Moore, the assistant director of home economics. She has associated with her one specialist and two district agents—one in West and one in East Tennessee. The women's work, which is just being developed, includes rural clubs. In each of 26 counties there is one county agent in charge of home economics. Under this head comes the Tomato Club work.

Each girl of the Tomato Club has 1-10 acre which she cultivates. In addition to cultivating this plot, she cans the surplus vegetables produced on the farm. During the past year the number of girls enrolled in the different counties were: Anderson 77; Benton 30; Blount 50; Bradley 40; Campbell 71; Coffee 29; Hamilton 193; Hardeman 53; Henry 100; Houston 30; Knox 150; Lincoln 54; McMinn 35; Madison 67; Montgomery 70; Polk 112; Rhea 46; Roane 44; Sevier 46; Shelby 119; Sumner 80; Tipton 42; Williamson 53; Unicoi 26; VanBuren 38; Warren 30. The total enrollment was 1,685. The total attendance on meetings was 48,891. 151 county and 1,171 community meetings were held and 823 reports were submitted. 51 winter garden demonstrations were made. The number of pounds of tomatoes reported by the girls was 816,009. Of other products there were 54,267 pounds. The total profits on 1-10 acre plots was $553.28. The total of all vegetables was valued at $21,018.66. The average profit per 1-10 acre varied in different counties and ranged from $7.37 to $48.80.

The Agricultural Experiment Station grew out of the combined schools of agriculture, horticulture and botany, founded in 1870. It was one of the first five stations in America, and was established as a department of the University in June 1882. The Station is doing now more and better work for the state than ever before. From five men on the staff at the time of the organization under the Hatch Act of 1887, the number has increased to 23, including 3 men in charge of the cooperative work of Middle Tennessee and the Superintendent of the West Tennessee Station.

The Station issues bulletins on the results of the experiments conducted at the Station. There have been 108 bulletins of the regular series, an average of four a year, and 33 press bulletins. They cover experiments on soils, fertilizers, grasses, cereals, forage crops, rotation, feeding, fruit and truck growing, plant diseases, insects, etc. The mailing list contains about 15,000 names and is rapidly growing. A large number of these bulletins are sent out daily in response to special requests.

A description of some of the work of especial value to farmers

was recently given me by Professor Bain. A destructive disease commonly known as clover blight had existed in Tennessee for at least 15 years, and was causing an annual loss to the clover growers of the state of at least $3,000,000. Professors Bain and Essary, of the Botany Department began a study of this clover disease about 10 years ago and found it to be due to Clover Anthracnose. After painstaking work in selecting, cutting and resetting, a resistant strain of clover has been developed, and is being spread over the state. Furthermore, a new variety of cotton has been bred in cooperation with the United States Department of Agriculture. This new variety, known as "Trice," is now extensively grown in this and other states. It yields well and possesses an earliness which makes it valuable as a cotton for weevil infested sections.

The tomato crop of Gibson and adjoining counties of West Tennessee had become a great source of income to the farmers of that section. Gibson was shipping about $150,000 worth of this vegetable annually when a tomato blight struck them. The disease soon spread and in places destroyed 50% of the crop. Professor Essary went over into their district and began studying conditions and working. Following the same principles as applied in the clover trouble, he developed a resistant strain of tomatoes, and outlined for these truckers a system of rotation whcih enabled them to overcome their serious trouble.

Professor Moores has done invaluable work in soil chemistry and agronomy. After about 20 years work with chemical analyses and field and plot experiments, the department is in position to advise the farmers of the state as to the use of fertilizers, rotations, and general soil treatment for their various sections. Variety tests have been made with soybeans, corn, oats, wheat, barley, rye and sorghum. These extended over much of the state in the form of cooperative experiments. In plant breeding work, a new variety of beardless barley has been produced, which possesses superiority, hardiness and smothness. Improved strains of corn, wheat, oats, and soy beans have also been developed.

While space will not permit a discussion of what has been accomplished in dairy records or feeding tests with live-stock, it might be well to mention that it was a former University of Tennessee man that discovered the serum for combatting hog cholera.

To meet the needs of men who are employed in the industries of the state, extension courses in Engineering are offered. This work was organized by Professor Ferris, Dean of the Engineering Department. This work costs about $500 and the money is furnished by the State Manufacturer's Association. A tuition fee of $5.00 for each course is charged to cover cost of instruction papers, postage, etc. Of course, no money is made out of this to be turned back to the University or to the Manufacturer's Association. Courses are given at Memphis, Jackson, Chat-

tanooga, Lenoir City, and Knoxville. In Memphis the work is under the supervision of Dr. Moreland of the Medical Department of the University. He has two teachers under him, one a University graduate and the other a high school graduate. There are about 72 taking courses there. At Jackson, there are about 18 taking work under one teacher. Professor Ferris has the work in Lenoir City, where 10 men are enrolled. He meets the men during shop hours and spends about two hours per week with them. He also has classes in Chattanooga, where there is a class of 27. He meets the men in one room, looks over their papers, and notes what the men shall work on the black-board. He used the more advanced men to help those less advanced. Each man spends from five to ten hours a week in preparation and meets the teacher once a week. The assignments for work are sent out to each student from the University just as he is ready for it, and are in pamphlet instead of text-book form. Most courses are in 20 assignments—one a week. In Knoxville there are 21 men in the courses with two class meetings a week. The classes are held at night. These courses will be given in any town of Tennessee where as many as 20 men make application for them. Furthermore, any one or more then one of the courses can be taken.

The report of the general education board says: "In the summer of 1906 the Tennessee representative and the superintendent made a compaign that touched every county in the state. Its central purpose was to impress upon the people the importance of having a complete and well articulated school system from the elementary school in the rural districts through the high schools and normal school to the university. The attendance at this series of mass meetings ranged from 100 to 7,000, perhaps 1,000 being an average. The meetings began in Memphis, July 20, and closed at the opposite end of the state just three months later. 79 towns had been visited and 150 speakers had participated. The Governor, and university and college presidents among this number. These efforts are fairly representative of one phase of the activities of the professors of secondary education.

Although the work of the Summer School of the South is not considered strictly as extension work, yet it has been of great assistance.

The University is also doing much in connection with secondary education and the training of teachers. The professors of secondary education formerly Professor Claxton, now Professor Clark, holds educational rallies all over the state. Many new county high schools have been established. The last report of the State Superintendent shows that there are now 117 county high schools in Tennessee. Practically all have been established since the founding of the Professorship of Secondary Education at the University of Tennessee in 1905. Of course, these schools were not established entirely through the agency of

the Professor of Secondary Education; but the two men who have held that chair have had a large share in the work of establishing them. Tennessee has spent $2,000,000 in high school buildings since that date. The University of Tennessee had a large share in bringing about improved laws in the State, especially in the passage of the General Education Bill of 1909, which provided for the establishment of three white and one colored normal schools and set aside one-fourth (changed to one-third in 1913) of the gross income of the State for educational purposes. For the passage of this law, no one worked harder and more effectively than did the Professor of Secondary Education and the President of the University.

THE HOT-BED AND COLD-FRAME

B. McSpadden, '17

Because of our early springs in the South we have never realized the full value that may be obtained by the growing of vegetables in the hot-bed and cold-frame. Since early vegetables can be grown only under glass, it is evident that the hot-bed affords the best means by which the small gardener may have a sufficient supply on hand. The hot-bed and cold-frame should become a part of the garden, and their construction should occupy a permanent place in its plans. The hot-bed may become most profitable when used for the early maturing of lettuce and radishes, and for starting the growth of cabbage, tomato, and beet plants. Thus, it is from the small gardener's point of view that we advise the construction of a hot-bed in the following way.

Location and Construction of Bed

First select a site on a sunny slope or in a protected spot open to the sun, and lay off the bed six feet wide and as long as may be desired. The length should be some multiple of three, as hot-bed sash are made three feet wide. Always have the bed with the long dimensions extending east and west. Excavate the soil to a depth of about two feet, and place a 2x4 post in each corner and at intervals of six feet along the sides. Let the posts extend six inches above the gound, and face them up with one inch boards, then bank up the earth around the bed so as to give a slope from the top edge to the frame work. The frame is much strengthened by putting strips across from the posts on the opposite side. If the bed be made twenty feet long it will be sufficiently large to grow a quantity of lettuce and radishes for family use. Forty feet of boards and five 2x4 scantlings ten feet long will furnish all the lumber required except for the sash.

Construction of Sash

The most important item of expense will be the sash. The usual size of such sash is 6x3 feet, holding 3 rows of 10x12 inch glass, with 6 lights to the row. Double-

strength glass of "A" grade will be found the most economical to use, because it does not break as readily as the lighter grades. Ordinarily, sash ready glazed ought not to cost over $1.75 to $2.00 each at the factory, but they may be made at odd times from cypress lumber at a still lower cost. Stock 1½ inches thick when dressed gives the best weight. The stiles should be made 2½ inches wide, and the rails 4 inches. No cross mountings are used, but two bars 1¼ inches wide should run the length of the sash. These with the stiles and top-rails are rabbeted ¼ inch wide and ½ inch deep in order to receive the glass. The glass laps like shingles, and the lowest light projects over the lower rail, which is only one inch thick. In pinning the sash, the holes should be bored from the under side not quite through, so that no leakage of water shall come from above. The lights of glass should be firmly set, with large points and a short brad at each lower corner; and then well puttied.

Method of Heating

Flues or rows of tile running beneath the beds and conveying the hot air and smoke from a small furnace affords the method of heating often used by the commercial gardener. The small gardener, however, must depend almost wholly upon the heat developed by a pile of fermenting manure beneath the beds. Fresh horse manure, with not too much straw or litter is the best material. This should be taken while fresh and made into a compact pile near your bed. When making the heap, the whole mass should be as uniformly mixed as possible; and if dry, it should be moistened slightly. Heating will begin at once and in twenty-four to forty-eight hours will reach its maximum. Then it should be turned to prevent firing, and the more rotted portion should be placed in the outer layers of the heap. This process should be repeated until the pile heats more slowly, and an even condition of temperature is gained. About the third turning the manure should be ready to be put into the bed. Fill the bed from 10 to 18 inches with this manure; tramp until it becomes firm, and moisten lightly. The temperature should then rise to about 120 degrees Fahrenheit, then slowly subside. If the temperature continues to lower then put on a loamy garden soil and plant as soon as it is convenient.

Planting and Care of Bed

The seeds should not be sown until the temperature has dropped below 100 degrees Fahrenheit. Before planting, the soil should be leveled, and tempered with water so as to be evenly moist. Lettuce and radishes may be planted in shallow rows four inches apart, and thinned until each plant has a radius of 4x4 inches. Beets and radishes may be planted at the same time in alternate rows, and the radishes will be harvested in time to give sufficient space for the growth of the beets. The plants should be thoroughly aired, and this can be done best by raising part of the sash at the upper end, even in cool weather, if the

sun is bright.

If you intend to set out your plants in the field it is necessary that you harden them in cold frames. The cold frame is constructed by the same method as the hot bed, only you should not use any heat. When the plants in the hot-bed show the third leaf during their stage of growth, they should be removed and transplanted in the cold frame. By this means the plants become gradually occustomed to the same conditions of temperature that they will have to undergo out in the field, and their growth will not be checked when replanted. Surely, it will pay the small gardener to construct a hot-bed and cold-frame, as they are indespensible to the production of early vegetables.

COTTON-SEED HULLS AS A DAIRY FEED

C. M. Hume

The most important commercial feeds of the South are the cotton-seed by-products, hulk and meal. Too much cannot be said in favor of the meal as a valuable concentrate, but the value of hulls as a roughage is not so readily conceded. Hull feeding began with the advent of the oil industry, along about 1870. Since then their popularity, as a milk and meat producer has increased to such an extent that many cattlemen rely on hulls to form the major part of their roughage. In Tennessee Bulletin No. 3, published in 1889, the author, W. E. Stone, says: "The fact that hulls have established themselves so thoroughly in common practice speaks well for their efficiency." This expresses the opinion of many stockmen of today, but it must be noted that at the time the bulletin was written hulls were worth from $2.50 to $3.00 per ton in Memphis.

Several stations have made comparisons of hulls with other roughages. The Mississippi Station found that 12 lbs. hulls were equal to 10 lbs. of Johnson grass hay.

South Carolina Bulletin No. 66, contains an interesting experiment, comparing the value of hulls and corn stover. The herd fed hulls produced milk at a cost of 7.14c per gallon, while milk from the stover-fed herd cost 6.84c per gallon. With this experiment as a basis, at the present price of hulls, the milk would have cost 11.24c per gallon. North Carolina Bulletin No. 199 makes the statement that 1¼ times as much hulls as corn stover is being fed. This station reports an experiment in which 7 cows were fed for three periods; corn stover being fed the first and last periods, and hulls the second period. The conclusion was that hulls are equal to corn stover, but states that they are not suited to dairy cows on account of their low palatibility and digestibility, and concluded by saying: "It cannot be denied that continuous feeding of an indigestible feed must ultimately prove deletirious to the usefulness of the dairy cow."

The Mississippi Station carried on an important experiment comparing hulls and silage, and found that the milk from the hull-fed cows cost 39% more than from the silage-fed herd.

Virginia Bulletin No. 148 gives hulls as containing .3% protein, 32.2% carbohydrates, and 1.7% fat; and concludes that they are equal to oat straw.

These experiments, while they point to many reliable facts, have not been carried on long enough to show the real status of cottonseed hulls. Hulls will always be on the southern feed market, and their value demands that further work be done in determining their value to the rapidly developing dairy and beef industry.

In conclusion, we may say that hulls may form a part of the ration, if silage is fed, and may be fed to dry cattle, but cannot be fed with profit when costing more than from $4 to $6 per ton. A few years ago profit could be obtained by feeding hulls but at the present price the feeding of hulls is done at a loss. With the wonderful opportunities offered in the South for growing a great variety of crops, the money which has been used in purchasing hulls had best be expended in "producing silage and legume hays."

A GOOD HERD OF JERSEYS

THE INFLUENCE OF PROTEIN ON MILK PRODUCTION

Frank S. Harkleroad, '14

While there are at present many unsolved problems relative to the nutritive effect of protein, there is no reasonable doubt that the vegetable proteids are the only source of similar substances in the animal body. This is equivalent to a statement, that from the protein are formed the muscles, the connective tissue, the skin, hair, horns, and hoofs, and the major part of the tissue of the secretive and excretive organs. Protein is also used as a fuel, that is, it is burnt in the body to yield energy.

Low Protein vs. High Protein Rations

At the University of Wisconsin, milk cows were fed in three groups, A, B & C, of three years each.

Period A—1900-1903, with medium protein ration.

Period B—1903-1906, with high protein ration.

Period C—1906-1909, with medium protein ration.

The method of feeding followed during period C was, in general, similar to that for period A, and consisted in feeding ration of rather wide nutrient rations—viz: 1:7 or wider. During the intervening period, B, 1903-6, received ration somewhat higher in digestible protein, and the nutritive ratio of the ration were as a result, brought down to about 1:6.

Average production per cow for different years:

Period A, 1900-1903—17 cows, average milk per year 7,612.6 lbs., per cent fat 4.17, butter 370 lbs.

Average, Period C, 1906-1909—25 cows, annual milk 7,681.0, per cent fat 4.24, butter 380 lbs.

Average, Period B, 1903-1906—26 cows, annual milk per cow 7,241.2 lbs., per cent fat 4.25, butter 359 lbs.

This experiment proves that a wide ration will give better results in the quantity of milk and butter, while the narrow ration gives a higher test in per cent butter fat.

Jordan: "Few instances are on record when in carefully conducted experiment station work, other conditions being the same, a moderate ration with a nutrive ratio 1:5.5 to 1:6.5 has not proved to be more efficient than one equivalent in quantity, but with a ratio materially wider." The observation of Atwater and Woods, among the dairy herds of communities where the owners were induced to narrow the ration they were found to be using, gave emphatic testimony as to the desirability of a larger production of protein than is ordinarily supplied in a home grown ration. This added protein may not be needed for construction uses, but its presence certainly in some way induced an increase in milk secretion. The chemical changes involved in milk formation are obscure and complex, and it may be that this extra protein somehow enters into their transforming process. One view which appears to be rational is that the presence of a generous amount of circulatory protein stimulates the cells of the body to great metabolic activity through promoting the secretion of milk solids. Jordan says: "A ration with as wide a ratio as 1:9.5 is regarded by the great majority of careful experimenters, and most intelligent dairymen, as less efficient than one rich in protein."

North Carolina Bulletin No. 213
Narrow vs. Medium Ration

Some feeding experiments were carried on at this station with medium and narrow ration. The cattle receiving the medium ration produced 7.5% more butter fat, while the milk yield was the same. In a second feeding trial with a narrow and medium ration, the narrow ration produced 7.6% more butter fat than the wide ration.

So far as concerns the experimental results in the bulletin, a comparison of the narrow and medium ration is equivalent to a comparison of corn meal and cotton-seed meal. The cost of the former was 1.3 cents per pound, while that of the latter was 1.5 cents, making a saving of 0.2 cents

per pound in favor of the cottonseed meal.

The economy of feeding according to the yield of milk or butter fat will depend much upon what yields are taken as a basis in feeding. In three experiments there was used about 2 lbs. of digestible protein for .50 to .65 lbs. of butter fat and the protein was increased by .3 lbs. for an increase of .15 lbs. in yield of fat. In the case of 3 herds the plan of feeding proved more profitable than the one of feeding a nearly uniform ration to all the cows. The experiments as a whole help to verify the earlier work of the station and point out the economy of feeding a larger proportion of protein than most farmers are in the habit of feeding. Rations supplying from 1.8 to 1.6 lbs. of digestible protein per day according to yields of milk or of butter fat have generally proven more profitable than those furnishing less protein.

In one experiment of 84 days duration, wheat was compared with barley and corn. The 12 cows used weighed on an average of 954 pounds. The amount of dry matter consumed daily per head averaged 24.3 lbs. The nutrients being 2.01 lbs. of protein, 12.03 lbs. of carbohydrates, .53 lbs. of fat. Of the protein provided, .66 lbs. was calculated as the amount needed for maintenance of body, leaving 1.35 lbs. available for milk production. The average daily yield of milk was 26.96 lbs., containing 4.1 per cent fat. On an average .05% of protein was consumed per lb. of milk produced. In the other experiment, which lasted 70 days, prairie hay was compared with timothy hay. The dry matter consumed daily was 24.5 lbs., the nutrients being 2 lbs. of protein for maintenance and 1.33 lbs. for milk production, 12.9 lbs. of carbohydrates and .6 lbs. fat. The yield of milk was 25.23 lbs., and fat content 4.07%. The protein consumed per lb. of milk was .048 lb.

Taking the average amount of available protein, charged to the cow in the experiment, reviewed, as a basis, it suggests that an allowance of .046 lb. of available protein to a lb. of milk of average quality yielded, is sufficient to maintain the flow; and by increasing or decreasing the allowance by .004 lbs. of protein for every test of the milk, the ration will be .5% of increase or decrease in the test of the milk, the ration will be adjusted to the needs of the cows giving the various grades of milk. Milk testing 3.85% fat is fixed as the standard average; and a cow giving that grade needs .046 lb. of available protein to each pound of milk she yields.

The formation of milk consists essentially in a rapid growth of new cells in milk glands. These cells consist largely of protein and we should, therefore, expect their formation to be more or less dependent on the supply of protein in the food.

The formation of milk consist essentially in a rapid growth of new cells in the milk glands.

In fact, all experiments agree in showing that the greatest yield of milk is obtained with a fodder rich

in protein. The size and quality of the milk gland, it is true, determine the maximum amount of milk that can be formed, but this maximum can be reached only by means of a liberal supply of protein.

Another effect of protein which shows itself in all experiments is its tendency to augment the percentage of solid material in the milk and to make the milk less watery.

Killner says: "As a milk contains a lot of protein substance, milk cattle must always have a sufficient quantity of this matterial in the ration if the tissues of the body are not to be used for the formation of milk." All the investigations in which foods rich in protein have been compared with those poor in this material, have shown the powerful influence which the former exercises upon the yield of milk. If the allowance of protein in a ration is deminished, then, although there may be a sufficiency of non-nitrogenous material, the quantity of milk decreases rapidly, as for instance, in one observed case from 9.7 kilograms to 7.65 kilograms, or in another from 13.4 kilograms to as little as 8.45 kilograms.

The Woff Lehman Standard for a 900 lb. cow giving 30 lbs. of milk, therefore, requires that the daily food shall contain 28.8 lbs. total dry matter, 2.97 lbs. digestible protein, 13.3 lbs. digestible carbohydrates, and ether extract; and if this is fed the nutritive ratio will be 1:4.5.

University of Minnesota: The heifer returned a pound of milk to .065 lbs. of protein available for production, while the mature cow returned a pound of milk to .045 of protein. The heifer required nearly one-half more available nutrients to a pound of milk than did the cow.

University of Minnesota: Reviewing the results on feeding of heifer and cow with wide and narrow rations it appears that the ration having a nutritive ratio of 1:7.7 and 1:9.7 respectively were as effective in the production of milk, butter fat and milk solids, as was the one having a nutritive ratio of 1:6.3.

Breeders' Gazette, Jan. 15, 1914: "For cows giving 20 lbs. of milk testing 3.8%, a ration containing 1.74 lbs. of protein, 11.7 lbs. of carbohydrates, and .50 lb. of fat would be approximately correct. To supply these food compounds, 4 lbs. of oats, 2 lbs. of bran, 2 lbs. oil meal, 12 lbs. of hay, and 10 lbs. of corn stover would provide almost exactly the required nutrients.

Numerous feeding experiments have shown that no animal can live unless it gets a certain quantity of protein. All other nutrients may be there in abundance, but if protein fails, partially or entirely, the animal draws daily upon its own body for a supply, and finally dies from protein starvation.

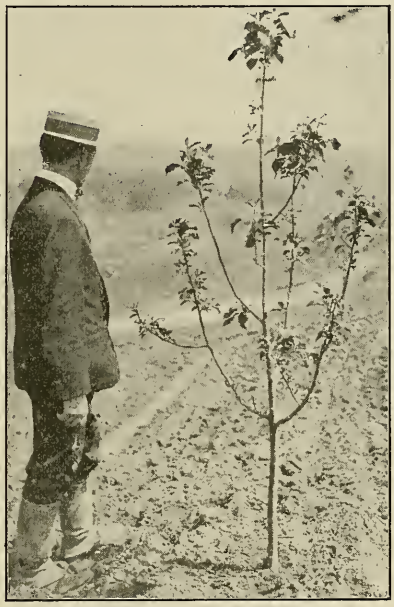
THE SELECTION AND PLANTING OF FRUIT TREES

Leonard J. Kerr, '18

The one great question which the farmer must consider who is preparing to put out an orchard is the selection and planting of the trees. In doing this, there are certain considerations which must not be overlooked. There are a number of ways by which the orchard may be planted, and the following suggestions have been found profitable in developing and working out these plans:

First, there are two grades of fruit to be considered, one for the general wholesale market and home use, and the other for the special of retail market. In the first case the grower sells to a buyer at the orchard or through commission men; while in the second case, he comes in direct contact with the consumer. In making this distinction such a selection to meet these demands is necessary. In either case the scorecard method of judging for selecting may be profitably employed.

The score card used should be one that will take both the tree and the fruit into consideration, giving a certain percentage of the points to the tree, and a certain percentage to the fruit.



A PROMISING YOUNG TREE

A card similar to the following might be adopted:

The Tree

	General Market	Special Market
1. Heavy bearer	17.5%	12.5%
2. Early bearer	12.5%	12.5%
3. Health & vigor	10.0%	10.0%
Total	40.0%	35.0%

Fruit		
Good color	18.0%	15.0%
Good Quality	14.0%	25.0%
Fair size	10.0%	10.0%
Keeps well	10.0%	8.0%
Good shipper	8.0%	7.0%
Total	60.0%	65.0%
Sum total	100.0%	100.0%

In selecting trees we should not judge by the fruit alone, for in many cases while the fruit produced is of good quality, the yield may be too small. It may be that the variety is not adapted to the particular section under consideration. Either the climatic or soil conditions may not be favorable for this variety. The heavy bearing trees are more in demand for general market production than for the special market. The grower can afford to sacrifice some in yield if he can grow an exceptionally fine grade of fruit and has a special demand for it. Along with the yield of the trees, health and vigor must also be considered, and none but inspected and sturdy, vigorous trees should be planted.

In selecting trees from the standpoint of fruit, we must consider the particular market for which we are raising the fruit. In the special market, the larger and more fancy the fruit the better price it will command. In the general market so much stress is not laid on these finer points of high showing quality—rather medium sized fruit of good color often being more in demand. The color is a large factor, and often sells the fruit. This is especially true of the great masses of people whose tastes have not been educated to appreciate the real flavor and worth of the fruit. Since it is true of the masses it holds that the buyer for the general market must recognize this and buy accordingly. Where the grower comes into direct contact with the consumer, he can often build up a demand for his fruits of fine quality regardless of color. A customer of this kind when once found and educated to like the particular product usually continues as a purchaser of this product. Thus, the man who has built up a demand for his superior fruit can feel moderately secure in this business as far as marketing is concerned.

In the selection of varieties for planting we must not overlook the keeping qualities of the fruit these trees will produce. It often happens that the market is overcrowded during the heavy fruiting season, and it is desirable to hold a part or all the crop until there is a greater demand for it. If varieties have been selected with this in mind, there will be less loss from storing and holding over.

Lastly, in selecting trees attention must be given to a few other factors such as: choosing trees adapted to the climatic and soil conditions; also, the size of the trees, and the price.

In preparing the land for the planting of the young orchard, it should be ploughed thoroughly, cut with a disc harrow, and dragged until it is smooth. Next, it should be laid off in squares. The road, if there be one near, or a line fence may be used as a base The rows

should be straight and the checks form perfect squares.

The hole should be made large enough and sufficiently deep to receive all the roots without crowding of twisting them. Of course, the long roots must be cut off, and those loosely hanging should be. In setting the tree, place it in the hole and put in first, around the roots, the dirt first removed from the hole. Then use the subsoil remaining to finish filling. Be sure that the tree is in a perfectly upright position then press the soil down firmly around it.

The distance between these checked rows, or the distance the trees are apart should be determined by the kind of trees, the soil and method of pruning. All of these points considered the following are the average distances recommended.

Apples	30 to 40 feet
Pears	20 to 30 feet
Peaches	15 to 20 feet
Plums	15 to 20 feet
Cherries	15 to 25 feet
Quinces	8 to 12 feet

The following table gives the number of trees per acre that can be set at the given distances.

	Trees		Trees
8x 8 feet	680	16x32 feet	85
8x10 feet	544	20x20 feet	108
8x12 feet	453	20x30 feet	72
10x10 feet	435	20x40 feet	54
10x12 feet	363	25x25 feet	69
10x20 feet	217	25x30 feet	58
12x12 feet	302	25x40 feet	43
12x20 feet	181	30x30 feet	48
15x15 feet	193	30x35 feet	41
15x20 feet	145	30x40 feet	36
15x30 feet	96	35x35 feet	35
16x16 feet	170	35x40 feet	31
16x20 feet	136	40x40 feet	27

OBTAINING A MARKET FOR THE FARMERS' BUTTER

H. E. Baker

The question of obtaining a market for the farmer's butter, or cream, has been studied very little in the South until within recent years. Now, there are a number of creameries in the South which are organized on the cooperative plan. To these creameries the farmer can send his cream and it is made into butter and sold and he receives all the money it brings above cost of making.

In order to get the cream from the farmer to the creamery, it is necessary to establish cream gathering routes which run through the country where the cream is to be gathered from the farm houses and hauled to the nearest or most convenient railroad station for shipment to the creamery. In some cases these routes are located on roads which lead directly to the creamery.

For an example, Shooks Cream Route may be given. This route was organized and the first shipment of cream was made April 26, 1915. This route is in Blount County, Tennessee, and the cream is delivered at Shooks Station on the Knoxville, Sevierville & Eastern Railroad, twelve miles from Knoxville. The cream is shipped from Shooks to the University of Tennessee Cooperative Creamery at Knoxville.

The cows that furnish cream for the Shooks route are mostly grades of "any old breed," however, many of them are fairly good individuals. There are only a few Jerseys, none registered, but a few of them are about pure blooded Jersey. There are also a few pure bred shorthorns, and some pure bred hereford cows on the route. There is not a pure bred sire on the rout, but some of the cows are bred to pure bred sires off the route.

There are twelve Tennessee wooden-hoop silos on this route and most all the patrons have fairly good pastures. The silos are filled, in most cases, with corn silage. Some patrons have been raising a silage crop of corn and sorghum, but in most cases the silage is made from corn of the regular planting, when the fodder is about one-half burned up. The ears are always stripped off. There are quite a lot of cowpeas grown along the rout, but soy beans have not been tried very much. Clover is also scarce along most of the route, but there is a great deal of grass hay grown.

The ration usually fed to the cows in winter varies with the different patrons. Some feed corn-and-cob meal, wheat bran, and cotton-seed meal; some, corn and cob meal and cotton-seed meal. Silage is fed where there is a silo, and grass or cowpea hay is fed. In summer the cows are generally not fed at all, but in some cases a little bran or corn meal is fed. There is no dairy barn equipment used, but cows are fed in box stalls or sheds.

AN INDIVIDUAL SHOWING MERIT

Before the route was established, there were no cream separators in the portion of country traversed by it. Now, May 27, 1915, there are seven cream separators in use

along the route and the quality of cream, which is not yet as good as it should be, is much improved even where no separator is used.

There are quite a number of good springs along the route and some fairly good spring houses, or milk houses; and since the establishment of the route, several new milk houses are being planned to be built in the near future.

The route which is twenty miles in length is made three times each week by the hauler. The wagon is equipped with enough ten-gallon shipping cans to hold the cream, a pair of milk scales, and sample bottles. Each patron's cream is weighed and sampled and then poured into a can. As some patrons have small amounts of cream, one can will hold that of several patrons. Each can is filled full to prevent churning. The sample bottles and sheet containing weights, and sample bottle number is sent in with the cans to the creamery each time.

The following table shows the number of cows, the amount of milk produced, the number of pounds of cream furnished, or shipped, and the number of pounds of fat furnished per week for the first four weeks.

WEEK	NO. OF COWS	GAL. OF MILK PRODUC'D	LBS. OF CREAM FURN'SHD
First	45	728	692.6
Second	61	1155	950.9
Third	75	1386	1091.5
Fourth	81	1456	1281.9

The number of gallons of milk in the above table includes that consumed by the family.

The following table shows the number of pounds of cream per mile traveled on route, the average amount of cream per cow, the number of pounds of fat per mile traveled, and the number of lbs. of fat per cow for the first four weeks.

WEEK	LBS. OF CREAM PER MILE	LBS. OF CREAM PER COW
First	11.54	15.39
Second	15.83	15.57
Third	18.18	14.55
Fourth	21.35	15.815

Before the route was established the farmer's wives had been making butter at home. More cows were usually kept than were necessary to supply the family with milk and butter in order to get the calves. Some of the patrons had regular engagements for their butter at Knoxville, and received 25c per lb. during 8 months of the year and 20c during the four summer months. Those who had no regular engagement for their butter sold to the local merchants or to a produce peddler and received 20 to 22½c in winter and 12 to 15c in summer. Since the route has been established the patrons still insist upon making their own butter for home use, but are well pleased with getting rid of the job of churning all the cream and making the butter; and of course, last but not least, the chance of getting a better price for the butter without the trouble of making it is very acceptable to all. The price now received being 25c per lb. butter fat during the summer.

The conditions and character of cattle on this route are given to show that they are about the average for Tennessee and that similar routes may be profitably established in many other places.

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Scientific; therefore practical

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EDITORIAL

Gradually, but with a feeling of conservatism and permanency, the farming interests of Tennessee are turning to scientific agriculture. This is evidenced not only by a continued increase in the attendance at the short courses of the University of Tennessee, but also by the personnel of those attending. Strong men who wield an influence in their communities are making up a greater and still greater percent of the roll as the Short Courses go on. Not only do they hail from the counties surrounding Knox County, and from East Tennessee; but Middle and West Tennessee are sending increasing numbers to these courses.

Again, the call of counties for short courses to be held in their midst is increasing, and new men are constantly being demanded by these counties to act as county agents. More Corn Clubs are being organized; live-stock clubs are being formed and various other organizations tending toward the breaking down of the spirit of individualism and the fostering of the spirit of mutual uplift and scientific cooperation. The University of Tennessee has striven long to bring about just such results, and has labored under difficulties at times seemingly insurmountable. Now it is beginning to see some of the fruits of its labors. The obstacles are not yet all removed. One of its greatest handicaps at present is lack of funds to furnish rooms and equipment for its increasing attendance; yet, in the face of these handicaps and difficulties, it labors on, rejoicing in these first fruits of its unselfish efforts, and hoping upon hope for

an opportunity to do yet more for the State that is worthy of the best. Just as it takes some time for a force to impart momentum to a large mass, even so it takes time for a University to educate and, through its force, move the minds of a state. But as was said at the outset this is gradually being accomplished.

New forces are being organized. Efforts are being coordinated; and cooperation looking toward still greater strides of progress is comming into evidence.

The business interests of the country are at last awake to the importance of agricultural improvement as a power for bettering business conditions. A few farsighted men have seen and realized this for a long time, but now there is every evidence that the importance of the matter is much more generally understood than ever before. Here we shall cite only a few specific instances which in turn will suggest many others of greater or lesser importance. One of the most important is the question of rural credits and the extension of banking accommodation to farmers. We shall probably have some important legislation along this line in the present congress.

In furtherance of their farm development campaign, the Nashville, Chattanooga and St. Louis Railway recently paid $7,000 for a 160 acre tract of land near Paris to be used as a demonstration or experiment farm in Henry County. Commenting upon the action of the railroad the Paris Post Intelligence says: "The good that will result therefrom will no doubt rebound to their benefit as well as to the benefit of the agricultural interests and, consequently, the business interests of this county." Similar farms are being purchased and operated by railroads in other counties. The Southern Railway is now paying the expenses of a student from each of the grand divisions of Tennessee for the four years course in agriculture in the State University. After graduation these men will do at least three years of agricultural work along the lines of that railroad and through the better condition and greater yields they may bring about, the railroad will more than be repaid. Some of our strongest banks are lending their aid to the introduction and breeding of draft horses in the South. One of the largest packing companies in the country is now advancing money to farmers and feeders for the improvement of the beef cattle industry. The manufacturers of farm implements and harvesting and threshing machines are now operating extension departments and demonstration farms all over the country. The business men of Memphis recently made a better farming campaign covering nearly a hundred counties in West Tennessee, Mississippi and Arkansas. Through the efforts of the Business Men's Clubs in the county seat, many counties of Tennessee have been able to secure the services of a farm adviser or county demonstrator. Many persons say "yes, that is a noble work and it will do much good." Right;

but don't get the idea that this is a work of charity. It is business. The men who represent the big business interests of this country are not striving for better agricultural conditions because they are kind hearted but rather because they are far sighted. If the farmers are producing bigger crops for shipment, the railroads profit in freight receipts. If the farmer does not prosper the bank does not have the desirable farmers' account, so it pays the bank to see that we prosper. The profits of the meat packers increase with the wider production of better beef cattle, hence, they find it profitable to aid the live-stock industry. It takes very little machinery to grow and harvest a small crop, while bigger crops mean more and better machinery, and with this in mind, the manufacturers find it profitable to help the farmer produce bumper crops. The business men of our cities know that business is booming when the farmer is prosperous and so they can afford to give time and money to form important campaigns. In short we may say that the captains of trade, finance, industry and commerce realize that better business conditions are brought about by agricultural improvement; and, therefore, find it profitable to help the farmer prosper.

C. H. M.

NEWS

The Short Course is progressing nicely, and the "Shorthorns" are taking a great deal of interest in the work that is being offered. About 85 students have enrolled, and more will come in the first of February. During January, Soils and Crops, and Live-Stock were the subjects discussed. During February the subjects will be Dairying for the first half of the month, and Truck and Fruit Farming for the last half.

S. D. Bayer and I. T. Elrod, members of the Senior Class in Agriculture, have been up at Kimberland Heights for the past few days making an official test of the Holstein Herd at Johnson Bible College.

The Extension Division has been very successful in the short courses which it has been holding. A large number have been held this winter. Courses have just closed in Hamilton and Bradley Counties, where eight courses of one week each were held—four in each county. These courses were under the supervision of the county agents, assisted by specialists and others from the Extension Division. Miss Geneva Conway, recently appointed specialist in Home Economics, has spent four days of each week at each of these short courses. Polk County has also held a short course, which lasted one week. Frank Hines, '14, is agent for this county.

The regular monthly joint meeting of the Agricultural Club and the Domestic Science Class was held January 11. The meeting was largely attended, and the program was very interesting. Music was furnished by the two quartettes—one from the Agricultural Club, and the other from the Domestic Science Class. Wm. A. Schoenfeld of the Extension Division gave an illustrated lecture on "Rural Social Problems."

Prof. Keffer and Mr. H. D. Tate of the Extension Division are both in West Tennessee this week. Professor Keffer is at the West Tennessee Normal School doing some landscape gardening.

A series of short courses similar to those held in Hamilton and Bradley Counties are being planned for Middle and West Tennessee during the month of February. Seven will be held in Middle Tennessee and four in West Tennessee.

Oscar Ferris, '14, who took his masters degree at Missouri last year, is coming back to Tennessee. He will go to Maury County, as County Agent.

The county agents in home economics will meet here at the University January 31 to February 19. The agents from all over the State will he present.

Forest Fleming, '14, who has been confined to his room for some time is out again and will go to Coffee County as county agent, February 1.

Two more new county agents, which the Extension Division has lately employed, are C. H. Doughty, '15, and F. N. Hutchinson, '15. Doughty goes to Sevier County, and Hutchinson to Marion. They begin work February 1.

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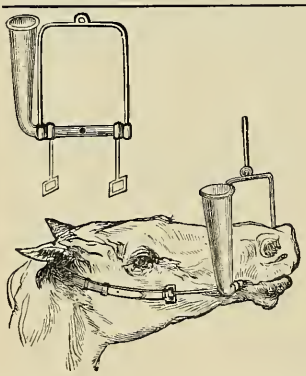

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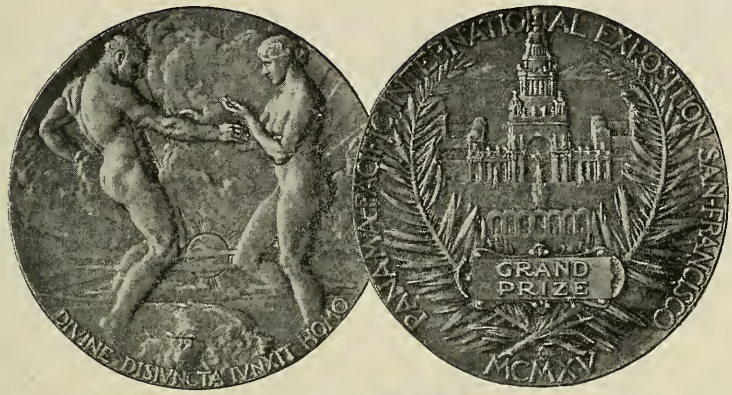

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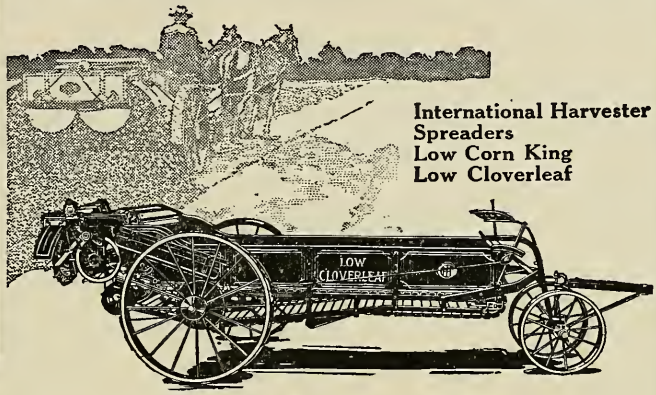

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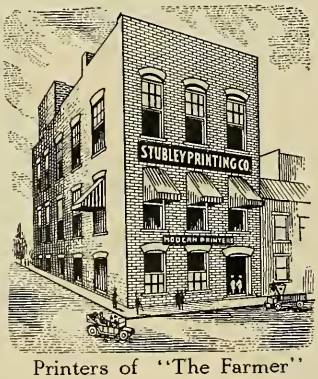

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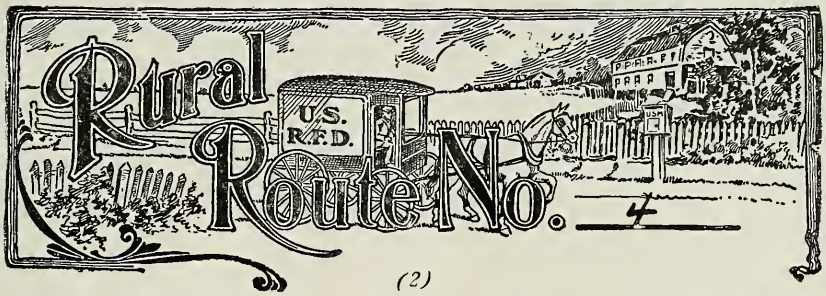

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no rain in October and the wheat is small and does not look like it would stand the winter well.

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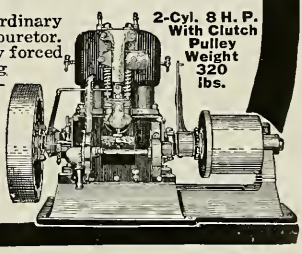

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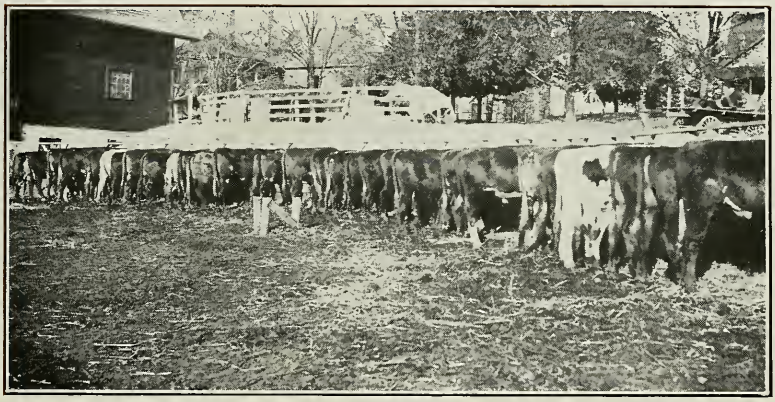

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Vol. X MARCH, 1916 No. 6

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Contents

Cherokee Deed Transferred to University of Tennessee 163
Hu. H. Phipps

The Dairy Industry in the South ---------- 165
(Notes from Farmers' Bulletin 349)
Robert W. Swatts, '18

Corn Ear Worm ---------- 169
O. M. Shelby, '17

Corn Stalks and Their Disposal ---------- 171
J. R. Clark, '18

The Importance of a Knowledge of Biology to the Farmer ---------- 172
G. Dikmans

Beef Production In Tennessee ---------- 174
W. W. Armentrout, '16

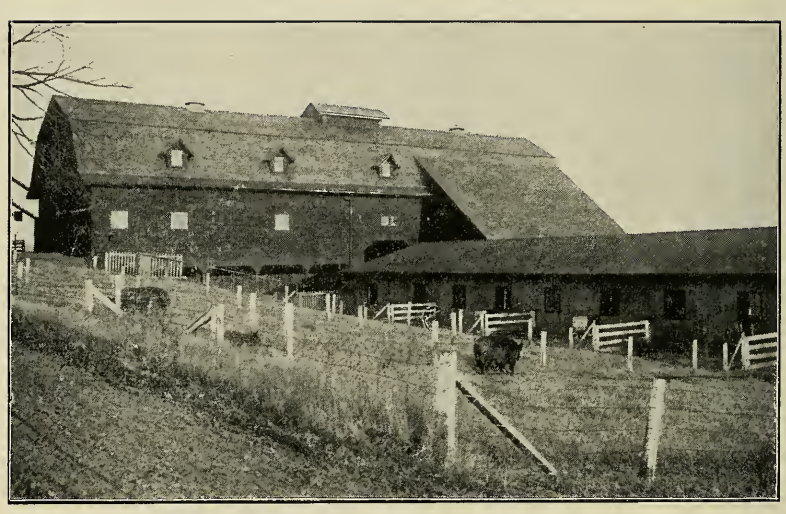
Parasites and Their Relation to the Farmer -------- 175
K. B. McKinney, '16

Winter and Spring Care of Lambs in Tennessee------ 177
B. M. Elrod

Survey of Corn Cultivation Practices ---------- 178
U. S. Department of Agriculture

News ---------- 182

Editorial ---------- 184



SOME BARNS AND HOG-LOTS AT THE KNOXVILLE STATION

THE U. T. FARMER

Vol. X | MARCH, 1916 | No. 6

CHEROKEE DEED TRANSFERRED TO UNIVERSITY OF TENNESSEE

Hu. H. Phipps

On Thursday morning, Jan. 27, 1916, the Cherokee Farm of 570 acres was transferred to the University of Tennessee with appropriate exercises at Science Hall chapel, Gov. Rye accepting the farm deed from Knox county on behalf of the State and in turn delivering it to Dr. Brown Ayres as representative of the University.

The formal exercises were preceded by numerous patriotic and popular selections rendered by the University band. Exercises were scheduled to begin at 10 o'clock, but the Governor's train was delayed and it was almost eleven before he and his party arrived. Upon their arrival they were given a welcome which recalled the palmy foot-ball days of 1914. A holiday was declared at the Hill, and the students in large numbers manifested their interest by being present for the event.

Dr. Brown Ayres presided.

After the scripture reading by Rev. W. C. Whitaker, the national anthem, "America," was sung by the audience. Dr. Ayres spoke of the interest shown by Knoxville and Knox County in the proper education of the young men and young women of the State. Prof. Morgan, dean of the College of Agriculture, was introduced and asked to tell of his "dream" and how it had resulted in the final acquisition of the Cherokee tract for the University.

This Prof. Morgan did in his stirring, forceful manner. Touching lightly on the beginning of his "dream" and the strenous task involved in its successful culmination, he dwelt upon the agricultural possibilities of the State, the awakening attitude of the farmers and the bright future in store for them. "If I had to be born again," declared Prof. Morgan, "I'd rather be born in Tennessee than in any other place I know of."

Judge R. A. Brown was next introduced by Dr. Ayres. He spoke of the wonderful agricultural developments of the past forty years, paying tribute to the Experiment Station, Prof. Morgan and all those connected with it. The deed was then turned over to Gov. Rye, who accepted it on behalf of the State.

Governor Rye expressed his appreciation of the Knox County Court and the City of Knoxville in making this gift to the State. "I believe that it is the best gift Knox County ever made," he de-

clared. He spoke at some length on how all wealth and prosperity begins and ends on the farm. In concluding he said that it gave him much pleasure to be able to hand over to Dr. Ayres the deed to the Cherokee property.

Dr. Ayres accepted the deed with a few appropriate remarks. He thanked the citizens of Knoxville and the County Court and others who had helped toward getting the property, and making Thursday morning's event possible. No lavish promises of the future were given, but assurance was expressed that under the able direction of Prof. Morgan the new addition would thrive and blossom forth until the most sanguine expectation of all was realized.

Judge Hu L. McClung in a very impressive address expressed appreciation in behalf of the board of trustees. A high tribute was paid Gov. Rye for the interest shown in the University. He sketched a vivid history of the University in the past, its accomplishments, and its fame, at home and abroad, its standing at present and its bright prospects for the future. After two selections by the "Agricultural Quartet," one of which dealt with the Cherokee farm, Commissioner H. K. Bryson was introduced.

Commissioner Bryson expressed appreciation on behalf of the farmers of Tennessee for the purchase of the farm. He paid a tribute to the officials of the University and of the Experiment Station, showing the position of the educator and the practical farmer and emphasizing the value of the cooperation existing between the two.

Greetings on behalf of the Board of Commerce were extended by Col. L. D. Tyson. He spoke of his pleasure at being able to attend, his approval of the transaction, his great appreciation of the untiring efforts of Prof. Morgan and the interest manifested by Gov. Rye.

Commissioner Hill delivered greetings on behalf of the City of Knoxville. He spoke of the importance of the new acquisition to the University and suggested to Gov. Rye that in preparing his next inaugural address he have it include a recommendation to the legislature to increase its appropriation to the University of Tennessee.

With appropriate remarks, a picture of the Cherokee property was then presented to the County Court by Prof. Morgan, and after the "Tennessee Song" had been sung and benediction offered by Dr. Whitaker, the meeting was adjourned.

The acquisition of the Cherokee Farm marks a great epoch in the progress of the College of Agriculture. The University, and especially the "Agricultural Department, have shown a remarkable growth during the past few years, the attendance in this Department having increased at a most encouraging rate. In 1905 there were twenty-three students enrolled; five years later sixty-one, a gain of approximately 300%; Oct. 23rd of the present school year the enrollment reached the 214 mark, an increase for the past five years of approximately 350% and for the past ten years of 934%.

At Tennessee, as at many other state universities, the Agricultural Department has come to stand for leadership among the other departments and with the hearty support of Knox County, the City of Knoxville, the State officials, the railroads, the banks and many individuals, we look forward to a period of great prosperity.

THE DAIRY INDUSTRY IN THE SOUTH

(Notes from Farmers' Bulletin 349)

Robert W. Swatts, '18

In dealing with the subject, THE DAIRY INDUSTRY IN THE SOUTH, three phases of it must be considered, viz. (1) Southern Markets for Dairy Products; (2) The Milk Supply of Southern Cities; and (3) Why Dairying Is Undeveloped in the South.

(1) In 1906-7 statistics were collected in 50 of the larger cities of 13 Southern States as to the amounts of butter, cheese, milk, condensed milk, and cream handled in these cities, which showed that the value of dairy products shipped into these 50 cities (not including similar products that were shipped into other cities of those states) was $22,957,882. Only a very small part of the total amount of butter produced in the South was made in creameries. The annual amount of butter made on the farms was 250, 417, 393 lbs., as compared to 1,140,138 lbs. made in creameries. The few regular creameries were compelled to use cream from long distances, often from adjoining states. About 23,450,000 lbs. of creamery butter were brought in from Northern and Western states, or over 20 times the amount made at home. This butter usually reached the consumer in poor condition. This was due to the fact that the small retail stores lacked the proper cooling facilities for handling the commodity. The quality of the dairy butter varied greatly. Some of the better dairies are making a product almost, if not quite, equal to the best creamery butter. Of quite a different grade is the butter that is handled by the country merchant. This butter is brought to him in various shapes and in various colors. He retails what he can of it and the balance he ships in tin cans or in barrels to the commission men in the large cities. By the time it reaches them it is likely to be very rancid as a result of not having been properly washed when it was churned. This product resembles axle grease more than butter. An advance must be made in the methods of manufacture as well as in the amount turned out before southern butter can meet the demands of consumers.

The scarcity of creamery butter in the winter time and the unevenness of color and the tendency to rancidity which characterizes the country butter, account for the large consumption of the better grades of oleomargarin. According to data furnished the Fifty-

sixth Congress, second session, 11.5% of the total amount of oleomargarine consumed was in the South. Of this amount less than 8% was manufactured in that section. The approximate amount used in the fiscal year 1905-6 was 6,766,223 lbs.

Practically no whole-milk cheese, or cheese of the Cheddar type, is manufactured in the South. According to the census of 1900 the amount of cheese made on the farms was 568,540 lbs., as compared to 212,951 lbs. in factories. The approximate amount handled in the larger cities was 42,000,000 lbs., of which the production of the South formed only 2%. This necessitates the shipping of large quantities of imported and American-made cheese of foreign types in order to supply this demand.

There is also a heavy ice cream consumption in Southern Cities. Much of this product, however, is of low grade, being made from whole milk and from bulk condensed milk. The price varies from 70 cents to $3 a gallon, the average retail price being about $1.50 per gallon.

In the South the consumption of cream is small. This is due to the scarcity of fresh cream rather than to a lack of demand for this dairy product. The cream sold is also quite variable in quality, some of it being only equal to a rich milk. The fresh cream in some cities is supplied by near-by dairymen, while others get it from long distances.

Condensed milk is consumed in large quantities in the cities and to some extent on the farms. In many sections in which the fresh milk supply is unsuitable for infant feeding, the physician invariably recommends condensed milk. Fresh cream being scarce, condensed milk is used as a substitute for cream and is also manufactured into ice cream.

(2) Most of the milk supply of Southern Cities is produced within a few miles of the place of consumption. Many herds are kept within the thickly settled portions of the cities where land is expensive. This generally means overcrowded stables, poorly lighted and ventilated, with contracted yards for exercise, filthy at all times, and almost knee deep with mud after a rain. The feed used in these dairies is largely such as does not call for much storage space, and is influenced to some extent by local conditions of production. Many city herds are fed nothing but cotton-seed meal and hulls. In some instances wheat bran is added. In cities where distilleries are located, distillery slop is fed. Where there are breweries, brewers' grain is prominent in the dairy ration. The cows of dairies farther removed from thickly settled portions of the cities get more green feed in season. At still greater distances, increasing amounts of green fodder are fed, though soiling as a system has made little progress. Where land is within an easy drive of the city and cheap enough, there is some pasturage.

Generally speaking, milk is not properly cooled by producers. The use of ice is unknown among ordinary dairies. Some producers

run milk over a cooler supplied with spring water of a temperature rarely below 65 degrees and frequently as high as 75 degrees. Others set cans of milk in springs or running water or make no pretense of cooling the milk, and can or bottle it for market at the natural animal temperature. The cooler sometimes stands in the stable and frequently milk is strained into shipping cans right in the dairy barn. Bottling is often done in rooms connected with the stable. The mild climate allows much of the work to be done out of doors, and this frequently results in unsanitary ways of handling the milk utensils and the milk itself, to say nothing of the exposure of the milk to impure air.

Most of the milk supply is retailed and distributed by the producers, very little being transported by railroad. Most of the milk is bought by the gallon, but some is bought on the butterfat basis. The milk plants in a few of the larger cities grew out of a movement of producers to relieve themselves of the expense and trouble incident to doing a retail business. On account of climatic conditions two deliveries a day are frequent. Bottles are used to a limited extent. The custom of dipping milk from open cans prevails and in many instances milk is drawn through faucets of large carriers. The quality of the market milk is generally satisfactory so far as amount of milk solids is concerned. In many instances it is much above the legal requirement, the percentage of butterfat averaging from 4.5 to 5 per cent, due to the predominance of Jersey blood among herds. As regards cleanliness and freedom from bacterial contamination, the South has its share of the ignorance and negligence. To this is due so much unsatisfactory market milk. Economic conditions have an unfavorable bearing, since many producers are renters doing a small business and struggling hard to make a living. Such conditions have a tendency to crush any ambition to improve. Generally speaking, there is no oversupply, and in many places milk is actually scarce at times. This shortage compels the use of much condensed milk, some of the large hotels being compelled to keep a stock of condensed milk on hand to be sure of an ample supply. Many cities have milk ordinances, though in not a few cases very little is done to enforce them. In some cities the collection of license fees and the issuing of permits for the sale of milk is the extent of milk inspection. Many cities had no inspection until a short time ago. Where ordinances have been in existence and have been enforced, the work under them has related largely to securing evidence of the sale of adulterated or under-standard milk. The sanitary side of dairy inspection has received too little attention, but a gradual improvement in that direction is noted. Several factors tend to increase the cost of producing milk in the South. In the first place but little attention seems to be given to keeping dairy cows which produce large amounts of milk. Secondly, considerable

work is done in an uneconomical manner. Thirdly, many southern dairy barns are unsuited for the most profitable production of milk, on account of the fact that cows cannot be kept comfortable in them at all times. They fail to furnish protection from cold weather and inclement conditions. Large quantities of buttermilk are consumed in couthern cities, and in a number of places it is claimed that nearly as much buttermilk is consumed as whole milk.

The southern market milk situation is capable of much improvement. The dairymen can reduce the cost of production very materially by keeping cows better adapted for market milk production, by studying economy of labor, and by using more cheap home-grown feeds suitable for milk production. Again, the situation is capable of great development by an increased consumption. The per capita consumption in the South is below the average for the county. Several reasons for this low per capita consumption of milk and cream can be given: Indifference as to the food value of milk, and inherited habit of using milk in small quantities, an insufficient supply, suspicion of the purity of the product, and the large negro population which consumes little or no milk.

(3) Dairying is undeveloped in the Southern States largely because the farmers of this section do not understand how to make it profitable. They realize the necessity of more fertilizer for their farms and they are buying large quantities of it at high prices. They realize, too, that barnyard manure is superior to commercial fertilizer, but they do not understand how to keep the cattle to make the manure without sustaining a loss on the cattle.

This is due principally to three things: (a) The cattle now kept are, as a rule, inferior and could not be kept profitably under any circumstances; (b) Many dairymen buy practically all their feed instead of growing it, especially those who live near the city and can get a good price for their products; and (c) the dairyman who lives some distance from the city and sells butter, as a rule makes an inferior product.

It has been estimated that the dairymen are annually losing not less than $175,786,776 because they are keeping cows that produce an average of 3,036 lbs. of milk per annum instead of cows that will produce 6,000 lbs. per annum. Due to the lack of the facilities of the farm and the great profit of retail whole milk, the raising of calves becomes a difficult and expensive operation, and as a result the majority of such dairymen rely entirely on the market for their supply of cattle. Those who do raise dairy cattle usually breed their cows to inferior, scrub, or grade bulls, and ignore the performances of the individual cow. To improve cattle, dairymen must have farm facilities, use discretion in breeding, and obtain sufficient skim milk for the feeding of calves by separating part of his milk, thus meeting the demands for sweet cream. The southern dairyman can never fully succeed until he produces more of his feed. It

is impossible to supply entirely from the market the kind of feed that is best for the cows and, even if a suitable feed could be obtained from the market, it would be more expensive than if grown on the farm. Green feed is very essential, and when it is not available direct from the field, it should be supplied in the form of silage. Pastures should be used liberally, due to the long pasture season and the cheap lands. There is a great movement in progress throughout the country to improve the milk supply and the quality of country butter placed on the market. To accomplish this it is necessary that a higher price be paid for a better quality of product since the cost of producing it is greater.

The three main points that every southern dairyman should bear in mind, and which cannot be too strongly emphasized are—

Better cows.
More home-grown feed.
A better product.

CORN EAR WORM

O. M. Shelby, '17

The corn ear worm is known by more different names than any other insect. On the corn it is known as the corn ear worm; on the tomato, as the tomato fruit worm; on tobacco, as the bud worm; on cotton, as the cotton boll worm. It works on many other plants, is a serious pest on cotton, and tomatoes, and does a great deal of damage to corn, tobacco, late beans, and certain years to clover, alfalfa, etc.

The first thing for us to know about the corn ear worm is its habits and life history, and at what stage in its development it can best be controlled. These facts can be shown by an experiment carried on in Fulton County near Hickman, Kentucky under the supervision of H. Garmon, State Entomologist of Kentucky. The first brood of the corn ear worm had reached maturity at the time observations began, and eggs for the second brood were found July 12th. From this date until September 19th, the eggs observed and collected varied in number with the number of adults of each brood. The number of eggs observed and collected increased until a majority of the individuals were mature, then gradually deminished; and as another brood of adults appeared they increased again to another maximum. The average larval period was twleve and one-third days. The average pupal stage was fifteen and one-third days. The total period from the hatching of the eggs to the time the next brood is to be hatched ranged from twenty-five to thirty-two days with an average of twenty-seven and two-thirds days.

Whenever the late brood mature, they enter the soil for pupation. Pupation and hibernation of the late brood takes place in cornfields, tomato patches, or wherever the late brood finds suitable food. This

fact points to a remedy which, if generally employed, would prove very effective in deminishing the injuries in a locality. This remedy lies in winter plowing and harrowing to break up the earthen cells and expose the helpless pupae to the weather and to their enemies. Four inches is a common depth for the larvae to go into the ground.

The corn ear worm varies greatly from season to season in regard to the amount of injury done. It may be difficult to find in a locality one summer, and appear in very great numbers the next summer. With local fluctuations of this sort, it is constantly present in cornfields throughout America, doing much damage last year in the country as a whole, not only by eating the corn, but also in doing vastly more injury by admitting within the husks moisture and with it molds of various sorts. The most of the molds to be observed on moldy corn are present only because the corn worm admitted them along the path it made in invading the ears. Thousands of acres throughout the corn growing sections of North America yield corn injured by the worms; and seasons of moldy corn are merely seasons during which the insects have been especially common. In most cases only one or two larvae occupy a single ear, because it is their disposition to attack and destroy each other when collected together.

While the untouched grains of these ears are good and may be used by farmers; there is always much greater loss than results from actual eating of the grain. Injured corn does not sell well and if too badly damaged can hardly be sold at all.

Figures show that this insect is not partial to any particular variety of corn. Additional observations were made at Hickman in western Kentucky in 1913, although some cotton was grown in the section, the insect confined its depredations very largely to corn. It was estimated that about twelve per cent of the weight of grain of infested ears was destroyed. The injury to cotton at Hickman was slight. This seemed to be due to the fact that there was a great deal of corn available in the vicinity of the cotton fields. As a rule the bolls injured were those on stalks nearest the fields of corn.

To prevent the injury to cotton by this insect, it would be advisable to plant a few rows of corn around the cotton field. This corn should be so planted that it will silk just when the cotton bolls are forming. Then the moths would lay their eggs in large numbers on the silks of the corn; and when the eggs hatch the larvae being cannibalistic in their habits would destroy each other until there would be only one or two remaining on the ear. Bolls attacked by this insect are rendered worthless; for the fiber that is not destroyed is stained and rendered unvaluable.

This is a chewing insect, but an arsenical would be of no avail. Perhaps this insect emphasizes as much as any other the importance of a knowledge of the life history in order to administer a practical method of control.

CORN STALKS AND THEIR DISPOSAL

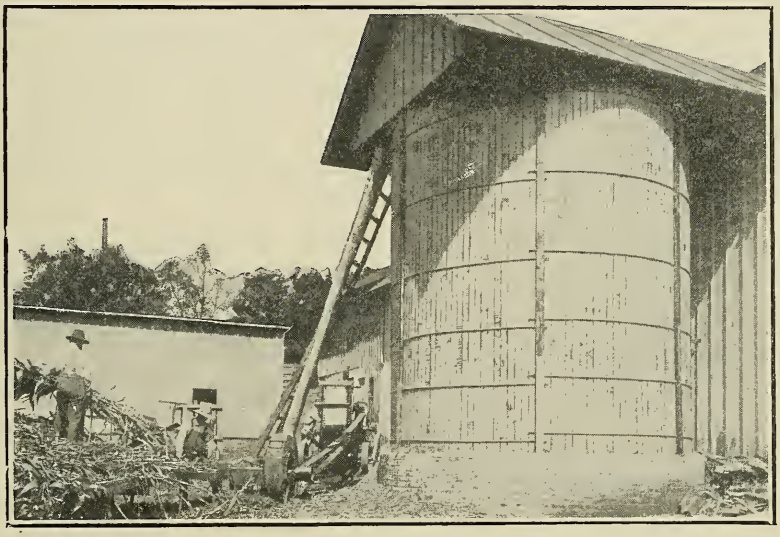
J. R. Clark, '18

The American farmer is noted the world over for his waste. This is in no way better demonstrated than by the disposal of his cornstalks.

It is a common practice in most of the corn growing districts to burn the stalks after the grain has been gathered in order to facilitate the preparing of the ground for the next crop. This method of clearing the land is a very easy one, but thousands of tons of material go up in smoke which should be returned to the soil to help keep up its humus content. The corn crop takes a large amount of plant food from the soil, and as much of this as possible should be put back on the land.

There are several ways of utilizing the cornstalk. It may be put into the silo, shredded and put into the mow, or the stalks may be plowed under and returned to the land in that way.

The silo is, without doubt, the best place for the stalks. Treated in this manner, they make a rich, succulent, and cheap feed which is of great value in the winter, and in the summer when the pastures are dry. The fodder should be cut into short lengths by running through an ensilage cutter. It should be wet and well packed in the silo.



A PROPER WAY TO DISPOSE OF CORN STALKS

If it is desired to gather the grain from the stalks before putting into the silo, the dry stover may be preserved by adding a generous amount of water. This makes a much more palatable feed

than it would make if it were fed as dry stover.

If one is not so fortunate as to have a silo, the dry stover makes a very desirable feed. This may be either shredded or left whole. The shredded stover is usually considered the best because it is easier handled in feeding, and can be stored in less space than the stover which is left whole. The coarser parts of the stover, such as parts of the stalk, which stock will not eat, makes fine bedding. It has great absorbent power and will absorb all the liquid manure which would otherwise probably go to waste. Cisterns for holding liquid manure are not needed on farms where shredded corn stalks are used for bedding.

Corn stover has about the same food value, pound for pound, as timothy hay. It makes a very good feed when fed in connection with some concentrated feed which helps to balance the ration. The majority of farmers do not appreciate the value of good corn stover as a feed.

If a farmer does not have the time or the need to use his corn stalks as feed, he should at least turn them under in order to keep up the humus content of his soil. There are machines on the market for cutting into small pieces the stalks as they stand in the field so that they may be more easily turned under. They may be covered up, though, if not cut up, by attaching a chain to the plow which will pull them down into the furrow.

The farmer will find that he is repaid an hundred fold for all the trouble and expense that results from properly disposing of his corn stalks.

THE IMPORTANCE OF A KNOWLEDGE OF BIOLOGY TO THE FARMER

G. Dikmans

To the student of biology Nature presents an ever varying and interesting panarama. As he traces the development of the morphology of plants and animals, and gets an insight into the great natural laws which have operated throughout the ages and are still at work bringing before him that inexplainable problem of life, he cannot fail to appreciate the immense Genius which called it into being, and the marvelous power by which that same Genius continues to direct the process.

From a purely cultural and educational point of view, every boy and girl should be given an opportunity to acquire a knowledge of the animate and also of the inanimate world in which, if you will have it so, they are forced to sojourn for a brief space of years; and surely no college man should go out into the world without a thorough training in the biological sciences.

From an economical standpoint, a knowledge of biology is important to everybody, but to none

more, perhaps, than to the farmer who passes his life in most cases ignorant of the great life processes by which he is surrounded. Biology affects him in all his various activities and interests. It affects his family, his live-stock, his land, his field crops, his garden, orchards, etc.

If knowledge is power, and power means responsibility and a determination to measure up to that responsibility, a proper knowledge of biology is that power.

If, for an example, every farmer living in a malarial district knew the cause of malarial fever and its means of transmission, he would not hesitate to do all in his power to help in the eradication of this disease. If that meant the drainage of low swampy places in the county and a consequent increase in taxation, for such a work, of course cannot be carried out without funds, he would not hesitate to contribute his share. Again, if every farmer knew, and he should know, the cause of anthrax, black leg, hog cholera and other infectious diseases among his cattle, he would not have to be forced to adopt the proper measures to prevent the spread of these animal scourges. He would unhesitatingly burn the carcasses of any animals dying from such diseases on his farm. This also applies to the adaption and carrying out of proper sanitary rules and regulations to prevent the spread of hookworm, typhoid fever, Texas fever, sheep stomach worm, to mention only a few of the more destructive organisms.

If every farmer knew the beneficial activities of the nitrogen gathering bacteria and of the organisms which affect the commercial and farming value of his manure, he would not delay in adopting measures by which he might derive the most beneficial results from the activities of these bacteria.

That a thorough knowledge of bacteriology is of great benefit to the dairyman needs no argument.

I have only touched upon a few of the lower representative forms of the plant and animal being. We might go on up the scale and select representative animals in each class, show their importance to farm interests, but neither time nor space will permit this. For anyone so inclined, it would be an easy matter to show statistically the importance of this relationship in dollars and cents.

Consideration of these facts will convince even the most rabid "practical man," the most outspoken scoffer of scientific technical work, the man, and there are unfortunately only too many of them, who gage the value of all knowledge in terms of dollars and cents, that a thorough, scientific grounding in these subjects is a matter not of importance only, but of absolute necessity.

BEEF PRODUCTION IN TENNESSEE

W. W. Armentrout, '16

Beef production is not given the attention in Tennessee, at the present, which it deserves. We have drifted in this part of our agriculture and we have been prone to drift down hill. The farmers of the State are beginning to grasp the importance of good beef cattle and the price at least of the cattle has risen.

At present, in Tennessee, there are 246,012 farms with an average acreage of 81.5 acres. On these farms are found 498,000 beef cattle in 1914. This makes two head of beef cattle for eighty-one acres. There are in addition to this 355,000 head of milk cows, which is about 1½ cows per farm. Quite a lot of these cows are kept on specialized dairy farms, so that the actual number on 80 acre farms would be reduced. This makes a total average of 3.5 cows on 81 acres of land.

Suppose we notice the condition of the beef industry in some of our sister states and compare our conditions with theirs.

The same year in which we were raising 1.5 beef cows per farm our neighbors in Iowa raised 2,683,000 beef cattle. Their farms average 156 acres, and they have 217,044 farms. This would be 12 head of beef cattle per farm of 156 acres, or 6 head per farm of 80. From this we see that they support four times as many cattle per acre as we do in Tennessee. Wisconsin produced an average of 6.6 head of beef cattle per farm.

Comparing figures for the last four years we get the following table which gives the general trend of the beef situation.

1911—Number of beef cattle in Tenn., 594,000; average price per head, $15.00.

1912—Number of beef cattle in Tenn., 576,000; average price per head, $14.70.

1913—Number of beef cattle in Tenn., 530,000; average price per head, $16.90.

1914—Number of beef cattle in Tenn., 498,000; average price per head, $21.40.

These figures show a graded decrease in numbers since 1911, but a greater increase in value per head, which makes the total value greater now than in 1911.

There seems to be a bright future for the beef industry in this Country, and it is just now becoming so that it is valuable to all parties concerned. Formerly the feeder had to make his profits by taking advantage of the misfortune of the growers of stocker cattle. One of the two failed to make money.

As better beef has been demanded, higher prices have been paid, thus enabling the producers to produce good beef. As a demand is made for better beef the price will rise. There seems to be no danger of the price rising so that the market will be filled; for, if the price is lowered, then beef cannot be furnished. Prof. Munford of Illinois, in his circular seems to

think that there is no danger of the price falling. The import trade is so slight that it has no effect on price, and if there should be an excess produced, there is a great demand for it to be exported.

In conclusion we might say for Tennessee that it should be one of the foremost beef producing states. It ranks well as a corn producer, and has all the facilities which will make it one of the foremost grazing states. There seems to be an increasing demand for corn-fed beef in preference to the cheap pasture-fed range beef. These range stocker cattle are being shipped into the corn belt states. In Tennessee there is no reason why we should not graze our own stocker cattle, fatten them on our own corn and have all the profits for our own.

Cattle can be grazed a long period of the year, and then we can fatten them on our corn. There is much rough feed going to waste that should be used by beef cattle. It is estimated that in Tennessee, this year, there has enough corn stover been wasted to have produced $4,000,000 worth of beef. Wouldn't this sum help the farmers out to some extent? Why not save this and raise more and better beef cattle?

SOME STATION FEEDERS

PARASITES AND THEIR RELATION TO THE FARMER

K. B. McKinney, '16

When we come to study the underlying principles on which a farmer's success depends, we at once see that it is through his farm crops exclusively; for he can not raise live-stock if he does not have the crops to feed. Then, the next thing that comes into con-

sideration is what are some of his limitations in crop yield? Here is one—Insects. How do insects affect his crops? Why is it often true, when we have a small outbreak of Hessian fly, army worms or plant-lice one year, that the next year and so on through the succeeding years they do not become so numerous as to make it impossible to grow wheat, corn, or oats? It is through the natural control by parasitism, predaceous insects, and birds, aided to a limited extent by artificial means—insecticides and cultivation. However, here we are going to discuss the parasites only.

First, what is a parasite? "A parasite is a organism that lives in or on some other organism from which it derives its nourishment for the whole or a part of its existance." This is one vital point in the control of economic insects, for there is no form of insect that is entirely exempt from the attacks of parasites. Some are never aware that they are being gradually devoured by minute forms, while others can withstand the attacks of their parasites only a short time. The latter case is true with the Chalcis-flies on plant-lice, Tachina and Ichneuman flies on army-worms, cut-worms and practically all leaf-eating larvae. It very commonly accurs that from 65%-85% of these pests are parasitized. Dr. Howard says that: "Out-breaks of injurious insects are frequently stopped as though by magic by the work of insect-enemies of this species," and that, "A minute bee parasite alone and unaided, almost annihilated the fifth brood of the cotton worm in Florida, fully 90% of the eggs of this prolific crop enemy being infested by the parasite, and in 1895 in Washington, more than 97% of the caterpillars of one of the most important shade-tree pests were destroyed by parasites." And, Farmer's Bulletin No. 640 has it: "There can be no doubt that parasites play a most conspicuous part in the natural control of the Hessian fly, and if we only knew the whole truth of the matter we should find that these minute friends of the farmer are worth many times their weight in gold," and that "one specie alone frequently overcomes the pest so effectively as to exterminate it in certain localities." There has been determined not less than six species of parasites of Hessian fly in the United States.

In California the practice of controlling insect pests that have been imported by artificial means is resorted to only when natural means cannot be relied upon. When one of these imported pests becomes so numerous as to effect the crop, the first steps taken are to trace it to its native country and determine what keeps it in check there. And if that controlling factor be a parasite, it is imported and is encouraged to aid in the control of the pest. It seems that this basis is a logical one for; when we can control our destructive pests by letting "bug" eat "bug," it is to our economical advantage to do so. Artificial means are not all-together satisfactory and are rather expensive.

WINTER AND SPRING CARE OF LAMBS IN TENNESSEE

B. M. Elrod

The sheep husbandry in Tennessee began over a centuy ago. Only within the last decade there came a great demand for lambs which greatly stimulated the sheep industry in Tennessee. The number of sheep and lambs increased until 1910 as shown by the census report. The possibility of utilizing the grain fields as winter pasture had just dawned upon the people, and many farmers proceeded to buy flocks of sheep. The knowledge and interest necessary to be successful sheep growers were lacking in many instances, and with many failures there came a steady decrease in the number of sheep grown in Tennessee. The decrease can be attributed to nothing other than an insufficient knowledge on the part of the farmer in growing and handling sheep; because Tennessee is an ideal state for the sheep industry. This is one among the few sections of the country that possess all of the natural advantages for sheep. A large portion of the Cumberland Plateau and many rough hilly farms in other sections of the state are ideal homes for sheep, and would bring greater returns to the farmer through sheep raising than through any other system of farming. This country affords the closest approach to the natural conditions suited to the life of sheep. There is no doubt but that the lack of knowledge and interest among the farmers have caused a decrease in the number of sheep grown in Tennessee. In a country so well adapted to the sheep industry, most every farmer, especially those in the rougher sections, should be engaged in this phase of live stock husbandry.

The farmers who, in the past, have discarded the sheep did not give him a fair chance. To many the business was new, and in order for the sheep to establish a permanent home with this type of farmer, he must bring in greater returns and live under the same conditions as the pig and calf. Sheep will not bring the greatest returns and live on the average farm under the same conditions as cattle and hogs. The sheep is a gentle and humble creature and should have protection. He will not contend for his share of the feed when fed with vicious farm animals. The sheep needs greater protection than most farm animals. The farmer who makes a success with sheep knows how to care for them at different seasons of the year. Sheep should have enough feed in the fall to be in good condition before winter. They should have free access to good pasture, or the deficit in pasture should be supplied with hays or small grains.

The climatic condition of Tennessee make it an unusually good place to grow lambs for the spring market. To get the best crop of

spring lambs, the ewes should have careful attention during the winter months. They should be separated from other sheep and placed in small flocks in separate fields or pastures. They may be pastured on wheat or barley during the winter except in extremely bad rainy weather. There should be a shed arranged for the sheep in rainy weather. The arrangement should be a matter of economy in affording protection, and in saving time and avoiding waste of feed. During rainy seasons all sheep should be under shelter. If the sheep are left to take the cold rain, the wool soon becomes wet and the sheep are chilled, colds and snuffles and other disorders follow.

The shed should be a light structure with ample floor space. The farmer should not study style, but simply the way in which he may use his money to the best advantage, with the most economy of time and labor. If the ewes are bred so that the lambs will be dropped in the winter, it is necessary that comfortable places be arranged for them, so the lambs will not become chilled before taking nourishment from the ewes. At this season a good shepherd is alert and sees that no ewe goes without the proper attention. If any ewes, when fed in the evening, show signs of lambing they should be placed in separate appartments previously arranged for them. And it is a good plan to visit them once or twice during the night to see if everything is alright. It is the custom with some farmers to allow their ewes to remain on the grain field while lambing. Where this is the case, the lambs often become chilled from the cold ground and die before the ewe is able to care for them. In the spring a grass lot furnishes a favorable place for the ewes at lambing time.

The young lambs should receive constant attention during the spring months. The ewes and lambs may be kept on the grain field as pasture until the grain crop begins to joint. The winter pasturing of wheat, rye and barley does not affect the yield of grain. The feet of the sheep are small and do very little damage to the land.

After the sheep has been removed from the grain field they may be placed on good pasture or receive enough grain and hay to keep the lambs in thrifty growing condition. The lambs should go on the market between May the 25th and June the 15th. After this time Virginia and Kentucky are strong competitors with Tennessee in the spring lamb markets.

SURVEY OF CORN CULTIVATION PRACTICES

U. S. Department of Agriculture

A detailed study of farm practice in the cultivation of corn has recently been made by the U. S. Department of Agriculture, for the purpose of offering to farmers in one locality an opportunity to obtain information in regard to successful practice elsewhere. Sur-

veys were made in 21 representative corn-growing regions, which are grouped into 5 divisions: (1) the central western; (2) the southeastern; (3) the south central; (4) the southwestern; and (5) the northeastern. In each of these divisions it was found that more or less distinct methods and practices are employed.

No specific recommendations to the farmer are made in Department Bulletin No. 320, a new publication of the Department of Agriculture which contains the results of these studies, but a number of important facts are brought out in regard to the cultivation of corn in general. Previous investigations, the report says, have shown that if weeds are eliminated, intertillage of any kind becomes a matter of minor consideration. The best method of eliminating weeds is a practical rather than a scientific question. What the farmer wants to know is, first, what is the cheapest method of making an adequate seed bed under the condtiions that prevail on his farm; and, second, what is the cheapest method of controlling weeds which infest his growing crop. An adequate seed bed the bulletin defines as land free from weeds and surface trash, sufficiently mellow to make easy penetration of the plant root, sufficiently compact to hold moisture and to be free from large air spaces, and sufficiently fine in texture to bring many soil particles in contact with the seed and thus to supply an abundance of moisture to the germinating plant.

Since the farmer is primarily a business man and not an agronomist, or, in other words, is more interested in making money than in raising large crops, it was found that economic factors played everywhere an important part in determining the methods of cultivation. On the most productive farms more cultivation to corn is given both before and after planting than on the less fertile soils. On good land extra labor is rewarded by increased yields to an extent which justifies the cost involved. On poorer land this may not be the case. If, for example, we assume that extra preparation results in an increase of 10 per cent, on soils which yield normally 60 bushels of corn per acre the farmer's additional work would be repaid by 6 more bushels. On soils which yield only 20 bushels under normal conditions, however, this extra work would return him only 2 additional bushels. Six bushels might easily represent a profit on the investment of labor, and 2 bushels a loss.

Similar reasons govern the kind of tillage employed. It has been ascertained that less acreage is worked per horse in the regions where improved implements and heavy teams are employed. On the other hand, more acreage is worked per man. With very cheap labor, one-horse implements may be more economical than heavier ones. On the other hand, where labor is high priced and horses and capital for farm machinery fairly abundant, heavier teams are more advantageous.

The question of drainage is also determined chiefly by economic

considerations. Tile drainage is practiced extensively only on the most productive soils, where land values are extremely high. In general it may be said that where land is cheap, the farms are large with a small percentage under cultivation. Where land is more expensive, the farms are smaller and a larger percentage of each is cultivated.

Subsoiling—the breaking up or loosening of the subsoil without mixing it with the top soil—is usually employed only in regions where the soils are low in organic matter. Sandy or loamy soils, unless they are underlain with a stiff subsoil, are usually plowed deeper than the heavy clay soils. When land is plowed in the fall it is also usual to break it deeper than when plowed in the spring.

The choice of fall or spring plowing is governed largely by the character of the crop which occupies the land the previous year. When corn follows sod, more land is generally plowed in the fall than when corn follows some cultivated crop. In Texas, Oklahoma, and to some extent in Kansas, the practice of plowing in the fall and then listing in the spring with either a middle buster or a combined lister and planter is quite general. This is almost equivalent to rebreaking in the spring.

The size of plows used is largely regulated by the type of soil and general prosperity and condition of the community. In the South Atlantic States one or two horse teams are used, while in the Central Western States the teams are heavier. Where hot, dry weather prevails during the growing season, listing is extensively practiced.

The amount and methods of tillage, it is said, are less important factors in determining the yields than is the extent to which crops that add organic matter to the soil enter into the rotation.

In addition to these generalizations, Bulletin 320 presents detailed tables of the prevailing practices in each of the 21 regions studied.

Practice in the South Central States

In this division surveys were made in a representative county in Tennessee, Kentucky, and in western North Carolina. This territory is located between the corn and cotton belts, the tillage methods combining practices from both regions, and little uniformity is found.

Using the data obtained in the three counties surveyed as a basis for calculating the average farm practice in this division, it is found that 35.9 per cent of the farmers plow in the fall to an average depth of 7 inches, 45.2 per cent plow in the spring to a depth of 6.7 inches, while 18.9 per cent plow in the fall to a depth of 8.1 inches and rebreak the land in the spring to a depth of 5.3 inches. The average depth of plowing for all divisions is 6.8 inches in the fall and 6 inches in the spring, and where both fall and spring plowing are done, the fall plowing has an average depth of 7.9 inches and the spring plowing 5.1 inches. The cultivations after plowing and before planting average 2.3; the workings after planting 5.2. Cor-

responding averages for all the areas studied are 2.3 and 4.6. The average normal yield of corn in this division is 34.3 bushels per acre, as compared with 36.3 bushels for all the regions studied.

Tennessee—Maury County: In this county the land is usually harrowed twice with a disk harrow, and once with a spike-tooth harrow before planting. Most of the corn is planted level and in drills. After the corn is up, it is usually harrowed with a spike-tooth harrow. Following this, most of the cultivating is done with a 2-horse 4-shovel cultivator and a 1-horse, spike-tooth cultivator. Usually 4 or 5 cultivations are given.

The average depth of plowing was found to be 7.7 inches. The average number of workings of the land after plowing and before planting is 2.7, and the average number after planting is 5.4. The average normal yield of corn per acre is 40.9 bushels.

Kentucky—Christian County: It is the usual practice in this county to do as much plowing in the fall as time and the weather will permit, and the remainder is plowed in the spring. A few farmers plow in the fall and then rebreak the land in the spring. After plowing, the land is usually harrowed twice with a disk and once with a spike-tooth harrow. When the land is cloddy, the roller is sometimes used. Most of the corn is planted with a 2-horse, 2-row planter. Some farmers plant by hand when labor is plentiful, and a few use a 1-horse planter. Seventy-three per cent of the planting is in checks from 3½ to 4 feet apart each way, with 2 stalks in the hill. Practically all the corn is planted level. After the corn is up, it is usually harrowed with a spike-tooth harrow. Most of the cultivating is than done with a 1-horse, spike-tooth cultivator and a 1-horse, 2-shovel cultivator. Frequently a 1-horse turning plow is used, first to plow the dirt away from the corn, which is known as barring-off, and then the middles are plowed out, throwing dirt to the corn. The 2-hose, 4-shovel and 8-shovel cultivators are used, but not so much as the 1-horse implements.

The average depth of plowing in this locality is 7.1 inches. The average number of workings of the land after plowing and before planting is 3; the average number of cultivations after planting is 5.1. The average normal yield of corn per acre is 36.9 bushels.

North Carolina—Alexander County: In preparing land for corn in this region, about half the plowing is done in the fall with a 2-horse plow. In the spring, before planting, this fall-plowed land is rebroken with a 1-horse plow, and the balance is broken with a 2-horse plow. After plowing very little preparation is given before planting. Usually the land is harrowed once or twice with a spike-tooth harrow, although a few farmeres use a disk harrow. The corn is planted level and in drills 4 feet apart, with one stalk every 2 feet in the drill. Most of the planting is done by hand. A few farmers, however, use a 1-horse planter. After the corn is up, the field is usually harrowed once or twice with a spike-tooth harrow.

Following this, most of the cultivating is done with a 1-horse, 4-shovel cultivator. Frequently the 1-horse, 2-shovel cultivators are used and occasionally 2-horse, 6 and 8 shovel cultivators are found.

Corn land is plowed to a depth of 6 inches on the average. The average number of workings after plowing and before planting is 1.1 and the average number of cultivations after planting is 5.1. The average normal yield of corn per acre for this locality is 25.2 bushels.

NEWS

One of the most important events in connection with the University lately was the formal transfer of the Cherokee Tract on January 27. Judge Brown presented the deed on behalf of Knox County. It was received by Gov. Rye, and in turn presented to Dr. Ayres, who received it for the University. The speeches of presentation and acceptance were brief and to the point. Gov. Rye said that it afforded him a great pleasure to be present, and to receive and place in the hands of the College of Agriculture, such a gift as the Cherokee Tract. All the speekers praised the Knox County Court and the Commercial Club for this gift, and for their interest in the University as a whole. Most of the members of the County Court were present, and many business men of the City attended the exercises. Other speakers were: H. A. Morgan, Dean of the College of Agriculture; H. K. Bryson, Commissioner of Agriculture; Col. L. D. Tyson; Commissioner Hill.

J. W. Aiken, Horticultural Agent of the N. C. & St. L. Railroad, visited the Division of Extension recently. He was here formulating plans for cooperative work in orchard management for farmers along the lines of that road. Mr. Akin will conduct demonstrations in spraying, pruning, tillage, harvesting, packing, and will assist orchardists in finding a market.

Prof. Keffer, Director of the Division of Extension, was in Washington on business the first of the month.

Two new county agents have recently been placed. Judd Brooks, who graduated here at the University a few years ago went to work in Madison County Feb. 1st. The other man, R. C. Riggan, went to work in Chester County on Feb. 8th.

On Tuesday, Feb. 15th, the Agricultural Club entertained the "Shorthorns," and the County Agents of Home Economics, who were here at that time. Mr. Arnold, President of the Club, acted as chairman. Speeches were made by Mr. Taylor and Miss Hamilton, representing the "Shorthorns"; Miss Smith and Miss Robinson spoke for the County Agents in Home Economics. Miss Conway

and Miss Ambrose also spoke concerning the work in Home Economics. Faculty men who spoke were Prof. Morgan and Prof. Bentley. Music was furnished by the Club Quartet. Refreshments were served.

During the week of Feb. 21st to 26th two short courses were held in West Tennessee by the Division of Extension, one at Dresden and the other at Trimble. The previous week five were held in Middle Tennessee at the following places: Carthage, Cookville, Lebanon, McMinville, Sparta. The attendance was good and the interest fine at each place.

On Friday, Feb. 18th, Miss Virginia P. Moore, Assistant Director of Home Economics, gave an invitation to the Professors, Seniors, and short course students to visit and look over the work being done by the Home Economics agents. Her invitation was to come and see "how we start nowhere with nothing, and get somewhere with something," and after seeing the hats which were made by these women it certainly looks that way. Demonstrations were given showing how to arrange kitchen furniture, have hot water for the bath, etc.

Sandwiches and tea were served.

Prof. Keffer and Miss Moore entertained at the Country Club Feb. 9th in honor of the Washington officials, faculty members, and others who were attending the Fourth Annual Meeting of the Tennessee County Agents of Home Economics.

The Fourth Annual Meeting of the Tennessee County Agents of Home Economics has just closed at the Division of Extension headquarters at Carrick Hall. This meeting eclipsed all others of this nature that have been held. The spirit of these women and the interest shown was very remarkable. They were called together to receive instructions in canning, cooking, housekeeping, sanitation, and other questions of interest to farm women. About 30 women were in regular attendance, there being that many in the field at the present time.

A new and very interesting feature at this meeting was the millinery under the direction of Miss Stroud. As far as is known, this is the first time millinery has been taken up in connection with Domestic Science in the rural sections.

Another new feature of this extension work is the Home Demonstration Club. Miss Geneva Conway, Specialist in Home Economics, has this in charge, and clubs for women are being organized. There are about 20 clubs now in the State.

Lectures and demonstrations were given in cooking by Miss Conway, and by Miss Sarah Kinsey, District Agent for West Tennessee. Those in charge of this work are: Prof. Chas. A. Keffer, Director; Miss Virginia J. Moore, Assistant Director; Miss Geneva Conway, Specialist in Home Economics; Miss Margaret Ambrose, District Agent for East Tennessee; Miss Sarah Kinsey, District Agent for West Tennessee.

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EDITORIAL

The U. T. Farmer is the organ of the Agricultural Students of the University and as such its first aim and purpose is to give an opportunity through its columns to the agricultural students for an expression of their ideas and ideals as they enlarge their vision of farm life. There is also another purpose which the magazine tries to accomplish. It tries to give through these various articles, information which will be of practical worth to the farmers who take and read it. These two purposes are not in any way antagonistic nor incompatible. In doing this it does not confine itself to student efforts, but when information of worth to its readers comes to hand from the professors of the University, from the State Experiment Station, or from the United States Department of Agriculture, it is glad to give space for the publishing of the same. Of late, the Office of Information of the Department of Agriculture at Washington has been sending out to the publications of the various colleges of agriculture of the United States, material of vital importance to the farming interests of the different sections. We are very glad to get this, and are more than willing to give as much space as is consistent with the best interest of our student publication. This issue is publishing one of these articles from the United States Department of Agriculture under the head of a "Survey of Corn Crop Practices In the Various Sections of the United States." Our readers may expect from time to time to find other articles from the same source bearing upon farming conditions and practices in this State.

Again, we would call the atten-

tion of our readers to the Station work of their own State done in Knoxville and Jackson, Tennessee. New bulletins are coming out from time to time, and these bulletins are for the farmers of the State. They are full of matter based upon actual experiments made under Tennessee farm conditions. A new bulletin has just been issued by the Station, under the work of Professor C. A. Wilson, head of the Department of Animal Husbandry in the University of Tennessee. This bulletin deals with the Relation of Steer Feeding to Farm Returns. It takes up the combination feeds: Soy-bean-grain and barley; Cowpea-grain and barley; corn and barley; soy-bean hay and barley; soy-bean grain and wheat; soy-bean hay and oats; and alfalfa. It gives the acre value of these combination feeds for beef production when grown in a rotation. Farmers will find this bulletin especially adapted to their needs and would do well to send for it. It is No. 114 and can be had by dropping a card to the Secretary of the Experiment Station, Knoxville, Tennessee. It, with the other available bulletins of the Station, are accessible to the farmers of Tennessee and we would like to see the already large mailing list of the Station increased. Every farmer of the State ought to be in touch with the Station and its work. Send a card to the Station, get on the mailing list and take advantage of the work that is being done for you.

It is often said that the State University stands as the capstone of the educational system of Tennessee. In a sense this is true enough. It is well and good for those who can prepare themselves for entrance and then spend four years on the grounds and in the laboratories of the institution. But since a large number of our people never reach the university that we face the problem of making the University reach the people. For a long time our educational institutions have been regarded as seats of knowledge, but it is only in comparatively recent times that they have come to be considered as centers of learning from which definite and valuable information is distributed in a systematic manner over a wide area.

This is accomplished, directly, through a well organized extension department and, indirectly, through several channels.

One of these is a short course for farmers which has become a fixed part of the annual program of the University. In the dull winter season a number of farmers enter the specially organized classes and receive much condensed practical information. They have an opportunity to see and study various soils, cover crops, farm machinery, live stock, dairy equipment and numerous other things of interest to the progressive farmer. The lecture courses embody work in crop rotation, fertilizers, insect enemies, pruning and spraying, seed selection and many kindred topics. These men usually show much interest in the work, keep accurate notes, and at the end of a few weeks return to their homes not only with better ideas

of farming in general, but also with plans and directions for many specific improvements over the old methods of tilling the soil. These ideas, when put into practice on the farms, may soon prove their worth to a considerable number of neighbors and so serve as forcible sermons in spreading the gospel of better agriculture into the four corners of every rural community.

Another event of important educational value is the annual fat stock show held at the University farm in January. At the first show three years ago only a few animals were entered and the rather limited interest and support came from a small group of business men and farmers who saw in it an opportunity to improve the live stock of Tennessee. Last year it proved more popular and the breeders of the State realized more of the possibilities of the event. This year the show was better advertised and the show ring was crowded with the large number of animals entered while the spectators taxed the seating capacity of the auditorium in Temple Hall. The people of Knoxville, the students of the University, and the progressive breeders and stockmen of the State were out to see splendid specimens of fat cattle, sheep and swine compete for honors and prizes. They learned the lesson of building up our native stock of domestic animals by the use of pure bred sires, the value of careful feeding and management of stock destined for the market, and something of the points to be considered in judging such animals. The interest in the last show was enthusiastic, and we believe that in this we have something which will be a great value in teaching the livestock growers of the State a practical and profitable way to improve the quality and increase the profits on the farm animals of Tennessee.

C. H. M.

(Additional News)

Jan. 27th was Knoxville night at the Fat Stock Show at the Experiment Station Farm. A large crowd was present, and many were turned away because of a lack of room to accommodate them. Gov. Rye and Commissioner Bryson were present and made short talks. Others who talked were Prof. Morgan, Prof. Willson, and Prof. Duncan. At the close of the Stock Show students of the Agricultural Department presented a scene around a typical country store with its familiar goods box orators, checker players, horse-shoe pitchers, horse "swappers," and county candidate.

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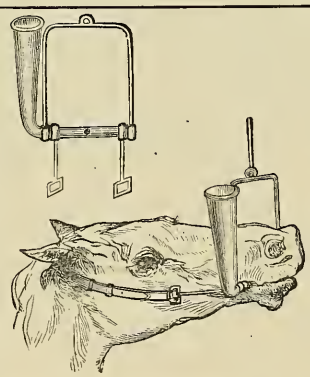

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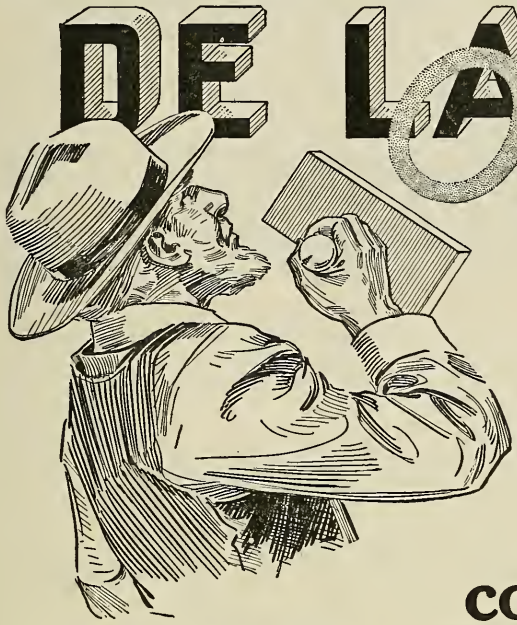

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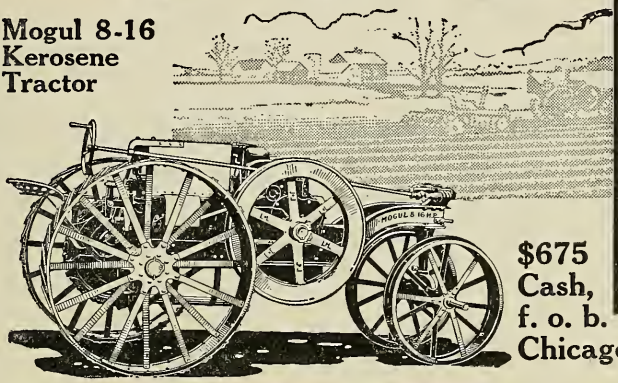

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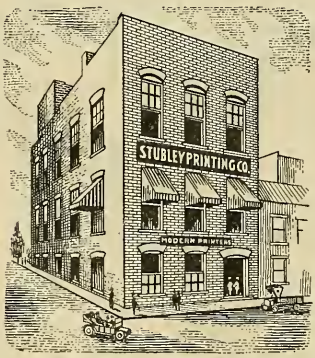

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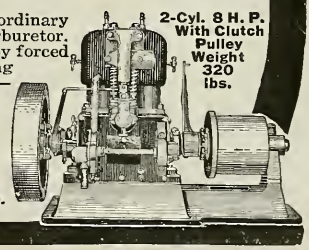

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Vol. X APRIL, 1916 No. 7

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Contents

Agricultural Banquet ---------- 195
Hu H. Phipps, '17

When Is the Best Time to Sell Live-Stock In Tennessee_ 196
A. G. Thomas, '16

Practical Plant Breeding ---------- 198
J. G. Leach, '17

Marketing Finished Products ---------- 202
F. W. Colby

High vs. Low Milk Production ---------- 204
C. R. Haynes, '18

The Fire Blight ---------- 208
N. I. Hancock, '17

Cooperative Handling of Live-Stock ---------- 211
J. C. Grimes, '16

News ---------- 213

Editorial ---------- 215

THE FIRST ARRIVAL THIS SPRING

Percheron Foundation, University Farm

Sire—Mazarin 105,580 (109,683)
Dam—Hardiesse 56,836 (73,464)

THE U. T. FARMER

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AGRICULTURAL BANQUET

Hu H. Phipps, '17

The annual banquet of the Agricultural Club of the U. of T. given Friday night in the private dining room of the Hotel Imperial, with over two hundred students and a number of prominent visitors present, was the most successful in the club's history.

Gov. Rye, State Commissioner of Agriculture H. K. Bryson, State Superintendent S. W. Sherrill, and Pres. Fairfax Harrison of the Southern Railway, who were invited, were unable to be present, but among the visitors were Jno. H. Peyton, president of the N. C. & St. L. Ry., and G. R. James, a prominent manufacturer of Memphis, and a member of the agriculture bureau of the Memphis Business Club.

Chas. A. Keffer, head of the Department of Extension of the State, presided as toastmaster. The toast card was well selected, each speaker having a real message for his hearers.

Mr. James, the first speaker on the subject of "Better farming for Tennessee." He spoke of the dependence of the cities upon the farmers and of the work of the Memphis Business Club in trying to improve the present conditions. The work of the preacher was pointed out with words of praise for "applied religion."

S. G. Abernathy and Miss Mabel Wheatley, of the University, made short and interesting talks on "Ten Years From Now," and "The Homemaker," respectively.

Dean Hoskins spoke on "The Aggies." He congratulated them on their work of the present and hopes for the future, making a strong plea that the geographical divisions of Tennessee be wiped out.

Col. L. D. Tyson sketched the early history of the University and declared his delight at its wonderful growth. "We must be prepared to feed as well as to defend our country," he said.

Pres. John Howe Peyton, of the N. C. & St. L. Ry., told of the rapidly growing reputation of the University. He told of a recent visit to Lexington, Ky., to address a meeting of county farm agents, at which many questions were asked about "the wonderful things we hear they are doing at the University of Tennessee."

Dr. Brown Ayres, president of the University, told of the reputation of "Tennessee" in other

states of the union and the banquet was brought to a close with a few remarks by Dean H. A. Morgan of the College of Agriculture, who discussed the spirit among the student body.

In addition to the speeches, a delightful musical program was rendered by the University orchestra, and the Agricultural Club quartet, while Arthur L. Rawlings sang "Where My Caravan Has Rested."

The success of this, the fourth annual banquet, is the source of much pleasure to all members of the Agricultural Club, since it marks not only the growth and success of the Agricultural Department but also the activity of the Club itself, which has come to stand for all that is progressive among the students of this Department.

WHEN IS THE BEST TIME TO SELL LIVE-STOCK IN TENNESSEE

A. G. Thomas, '16

The average feeding period of cattle is one hundred and twenty days—from the middle to the last of November until March. In order to make the business pay, we must not feed cattle too long on expensive feeds; neither can we afford to keep them after they get in condition for the market. Last year steers brought a good price in the fall. In fact, they brought more than farmers could afford to pay for feeders without a very bright outlook for high spring prices. But in the spring the price dropped so low that some were compelled to sell at what they had paid for the steers.

At certain seasons of the year it is more profitable to sell steers on the market than it is at other times. The price is nearly always higher near the latter part of the year. The following table shows the prices of two classes of steers on the market for each of the twelve months:

Month	Good to Choice Native Steers per 100 lbs.	Cattle—Inferior to prime
Jan.	$6.05	$4.66
Feb.	6.01	4.62
Mar.	6.25	4.73
April	6.45	4.81
May	6.39	4.83
June	6.66	4.81
July	6.77	4.83
Aug.	6.86	4.93
Sept.	6.90	4.95
Oct.	6.93	4.94
Nov.	6.60	4.90
Dec.	6.75	5.52

The above prices may vary in different markets and from one year to another, but they are accurate enough in showing the relative prices through the year. From this table it would seem that the best time to sell steers is in December; but there are other factors to be considered. When our cattle

come in from the pasture they are in a good condition to put on fat; but they are far from finished and would bring at best a dollar less per hundred than if properly finished for the market. The average farmer has much rough feed such as wheat straw, corn stover, etc., to which he can add a little cotton seed meal or silage, and thus carry his cattle over the fore part of the winter on very cheap feed and at the same time have them put on flesh. In March he can turn the cattle on pasture and by feeding a little corn and hay can have them in good condition for the June market. If he sells in the fall his rough cheap feed will go to waste and he will also loose much manure, which is usually badly needed on the farm. Winter feeding gives employment to both hands and teams when ordinarily there is little other work to be done.

The marketing of hogs requires just as close study of market conditions as does the marketing of cattle. In the same way, local conditions may somewhat vary the time of marketing, but usually these conditions can be adjusted to meet market demands. The following table shows the average wholesale price for hogs through a period of ten years in city markets, giving the fluctuations in price by months.

Month	Hogs—Mixed Packers St. Louis, per 100 lbs.	Hogs—Chicago, per 100 lbs.	Hogs—Fair to Good Packers, Cincinnati, per 100 lbs.
Jan.	$6.14	$5.85	$6.21
Feb.	6.33	6.09	6.42
March	6.63	6.37	6.86
April	6.65	6.44	6.78
May	6.49	6.20	6.51
June	6.54	6.33	6.55
July	6.79	6.55	6.81
Aug.	6.79	6.50	6.86
Sept.	6.93	6.61	6.93
Oct.	6.58	6.22	6.57
Nov.	6.06	6.71	6.98
Dec.	5.91	5.66	5.99

We can see from this table that hogs bring the highest price in September, and there seems to be little reason for not having them ready to place on the market at that time. It is a very expensive practice to carry hogs over winter. With cattle it is different, because they will consume the rough feeds which otherwise would go to waste; but hogs must be fed expensive feeds, and if a profit is to be made on them, the feeding process must not be unduly prolonged.

If hogs are to be fattened for market, the crops should be planned so they will have a good summer pasture from early spring to late autumn. Rape should be planted in spring and it will be ready for pasture in from six to twelve weeks, and if not pastured too heavy will last until fall. In August it is advisable to have a field of cow peas or preferably an early variety of soy beans (Ito San) for a hog pasture. If in ad-

dition to such pasturage the hogs be fed concentrates to the amount of 3 to 3½ pounds per hundred pounds live weight each day, they will be in prime condition for the September markets.

Just as the market prices vary through the year for hogs and cattle, so we find a similar rise and fall of prices for sheep on the big markets. Here there is even greater fluctuation, making it of more importance to the feeder to have his product ready to ship at the right time. The following table gives the ten year average prices by months for sheep.

Month	Sheep—Good to Choice Native, St. Louis,	Sheep—Inferior to Choice, Chicago
Jan.	$5.20	$4.19
Feb.	5.49	4.40
March	5.85	4.95
April	6.11	5.02
May	5.77	4.80
June	5.25	4.44
July	4.66	4.09
Aug.	4.50	3.84
Sept.	4.53	3.81
Oct.	4.62	3.70
Nov.	4.67	3.71
Dec.	4.75	3.96

From this table we would judge that the best time to sell sheep would be in April. But it is a difficult matter to get our lambs ready for this market. The most practical plan is to try to get our lambs to come in January and then sell them as soon as they are large enough for the market. It requires considerable care and attention to lambs to get them ready for the market in prime condition, but it is profitable to give them the best of care, and the feeder should be sure to have them ready to go to the butcher early and in prime condition. It is advisable to keep the late ewe lambs for breeding purposes and send the rest to market. If the latest ones cannot be prepared for the June market, it is more profitable to keep them over summer on good pasture then finish with a little grain and ship in October or November.

PRACTICAL PLANT BREEDING

J. G. Leach, '17

Domestic animals have been selected and bred ever since our earliest historical records. From the earliest times the sex difference in animals and, perhaps, the value of crossing animals of superior merit have been realized. With plants the case is very different. The sexuality of plants was established comparatively recently (about 1690). It is only during the last century that anything definite has been done in the way of selection for the development of cultivated plants, and plant breeding is yet in its infancy. There have been very few men who have appreciated the gain that may be achieved by thought and time judiciously spent in selecting seed for their future crop.

Many popular articles, highly

colored and exaggerated, have been published recently, which have led some people to waste time and money working after fabulous results. The busy farmer should use caution in accepting rash promises of wonderful results, but there is no doubting the fact that if a few of the fundamental principles of heredity are known and kept in mind the average farmer can make selective breeding a paying practice.

The grower who fails to use the best methods of tillage and fertilizers cannot expect to get the best results from his business. The use of improved seed is just as important a farm practice as cultivation and fertilization. Cultivation and fertilization give better results temporarily; but by breeding better plants may be brought into existence, which will be better producers for all times. Some one wisely said, "Good seed are cheap at any cost, poor seed are time and money lost." The importance of good seed, however, is probably more often over-looked than any other phase of good farming. It is safe to say that a large majority of the seeds planted in this State are planted without a knowledge of their previous history. Seed obtained from unknown sources are likely to produce a high percentage of unprofitable plants, undesirable types, and often diseased plants.

FIG. I—A BLIGHTED FIELD

A Considerable Part of the Crop Was Gathered Before Blight Attacked This Patch. Notice that the Fruit Still Hangs on the Vines Though They Are Dead

It is a prevalent idea that crops of one kind tend to "run out" when grown continuously without change of seed. Results from carefully selected cotton, wheat, oats, and other crops show that strains of these plants become more adapted to local conditions the longer they are grown and selected in that locality. The so-called "run out" condition is due to lack of selection, which allows the crop to become overrun with unproductive

and undesirable plants. These undesirable plants not only reproduce their kind, but also intercross with better types, and so lower the average standard. Straight simple selection is sufficient to prevent the "running down" of any good variety.

There are two common methods of selective breeding; straight field selection, or simple selection from seed plants; and hybridization followed by selection. The former is the most practical method for the average farmer. This plan is very simple, and if properly carried out will give excellent results. Breeding by selection is in effect nothing but the elimination of poor inheritance, and thereby giving prominence to these individuals possessing desirable qualities.

The successful improvement of any crop is dependent upon two factors, variation and heredity. Every one is familiar with the great variation among plants of all farm crops. In no field can we find any two plants alike, and there is often wide variation in many characters. Variation has played a large part in the development of all cultivated varieties of crops. Heredity is the force that is responsible for the passing on of parental characters to their offspring. It has been shown by actual tests that some plants are capable of transmitting good qualities to their offspring while others lack this power. For this reason it is evident that we must not only see that the plant from which we select seed has good qualities but we must also find out whether or not it is capable of transmitting these qualities. We must plant seed from each selected individual in a separate row and make a careful study of the offspring.

Every farmer who undertakes to improve his crops by this method should have a clear conception of what he considers an ideal plant. A close study of the plants under consideration is the best method of determining this ideal. Ideals will vary with the variety of crop, the local conditions, and the individual tastes of the breeder. But there are qualities that should be incorporated in the make-up of every ideal plant. It should be a good producer; true to type; free from disease; and above all, the seed from this plant should be capable of producing uniform plants with the good qualities of the parent.

A good variety that has been grown in a section for some time is usually the best material with which to begin selection.

The first step in selection takes place in the general field crop where we give close study to individual plants, keep our ideal well in mind, and remember that we must take the entire plant as the unit of selection. We must guard against being misled into selecting a plant because of some one good character while the other characters of the plant are deficient. Do not select an unusually large ear of corn unless the stalk is developed in proportion to the ear and tends toward the ideal. Do not select from a cotton plant with a few abnormally large bolls and a large number of small ones, think-

ing that the seed from these large bolls will produce plants with uniformly large bolls; for such is not the case. These seed will give rise to plants as near as possible like the plants from which they were taken. A cotton plant used for selection should, among its other good qualities, be well branched, and have a large number of well formed bolls. It should be early enough to escape frost and be entirely free from disease.

When the plants to be selected are decided upon they should be marked and gathered separately. The following season the seeds of these plants should be planted in a special seed plat. One plant's seed to the row, and carefully studied and selected, eliminating the weak and undesirable as soon as they can be determined. This is done to prevet them from fertilizing better varieties. Save enough good plants from the seed plat each year to plant next year's plat and use the rest to plant the general crop. There are different details of method for each crop planted in such plats but they cannot be discussed here.

FIG. II—A RESISTANT PLANT IN A CHECK ROW

All the Surrounding Plants Were Killed by the Blight. Seeds from This Plant Produced Wilt Resistant Tomatoes

If this plan is carefully carried out marked improvement in the crop is sure to be made, and will more than pay for the time and

expense. In addition to the general improvement, a careful and understanding breeder can do much toward eliminating distructive diseases. It has been shown in several cases that plants wholly resistant to a specific disease may be gotten by only two or three generations of careful selection. A good example of this is the work done by Professor Essary at the Tennessee Station a few years ago, when by two years of judicial selection a strain of tomatoes was produced which was almost entirely resistant to the dreaded tomato blight. The tomato growers of the vicinity of Gibson and Humbolt can testify as to the results of these few years of selection. Another instance is furnished in the work done by Professor Bain of the same station in developing a blight resistant strain of red clover.

MARKETING FINISHED PRODUCTS

F. W. Colby

Farmers are now being brought face to face with the fact that the profitable marketing of farm products is as important as growing them. In the past cheap land made cheap production possible, and famers only concerned themselves with the growing of crops. As it is now, with the increased cost of production, caused by higher farm wages, higher land values, cost of fertilizers, losses due to diseases and insects, and in some cases lower yields, we will have to pay careful attention to the marketing of our products and to the kind of products we market. Increased production alone does not necessarily improve the condition of the farmer. The average farmer pays much less attention to marketing than to growing, yet growing is relatively simple in comparison with marketing. You could not find a successful manufacturing plant that gave all thought to manufacturing and paid no attention to selling. A farmer is in a sense a manufacturer and the farm is his factory.

Usually the first thing thought of in connection with decreasing marketing expenses is the elimination of the middleman. Much waste results from the employment of middlemen who perform no clearly useful or necessary function. Many farmers, however, could not market their products without the aid of a middleman. The only way the producer can deal directly with the consumer is to produce what the consumer wants, that is, the finished product. By finished product in this sense we mean product that is ready for the consumer—or the butcher if it is live stock in question—a product that does not have to go through other hands to be made marketable. If the producer insists upon throwing upon the market unstandardized products, the consumer, who wants to know exactly what he is buying, will not purchase direct. Some one must do

the grading and finishing. If the farmer does not look after this part of the work he must expect others to do it for him, and at their own price. The government is now doing what it can to bring producer and consumer together by means of the parcel post. This opens up a new field to the farmer. He is given the opportunity of direct dealing; but it must be remembered that a uniform finished product of good quality is what the consumer expects.

The more we perfect our product, and the more our product complies with the demands of the consumer, the better prices we get, regardless of whether we sell to the consumer or not. If the farmer finishes the product on the farm, he realizes the maximum amount of profit. He is getting the highest possible price for his air, water and plant food elements. He is not decreasing the fertility of his soil by selling large, bulky, and relatively low priced products. He retains the by-products, most of which will in the end find their way back to the land. He is practicing a permanent agriculture, and not merely mining the soil.

Suppose we take butter as an example of a finished product. The buttermaker has a small, high priced product that is well adapted for sale direct to the consumer. On account of its small bulk, it can be profitably marketed by means of express and parcel post. Only a small percent of the plant food elements required to produce a pound of butter ever leaves the farm, and we realize more profit from the small amount that does leave than we would from the sale of the feeds used. The by-products of butter making, skim milk and buttermilk, can be marketed in the form of pork. Farm butter that is of such low quality that it has to be renovated before it finds its way to the consumer is not a finished product and what profit there is made on it is made by the renovating factory.

The farmer who sells his cattle for feeders is not getting all the profit there is to be made off of them. Someone else will make a profit by preparing them for the butcher that could just as well go to the original producer in most cases. Even in years of high priced grain and relatively low priced meat, the best returns are made by marketing grain and hay in the form of meat. Besides the increased profit the farmer has the manure which is a very valuable, although sometimes neglected, product.

By cooperative marketing a number of farmers engaged in similar lines can lower the expenses of marketing and transportation and enable them to place a better article before the consumer at the same or lower price. In each farming community the bulk of the produce must be shipped out, and by cooperating the farmer can gain much, not only in reduced freight rates, but also in getting efficient service and controlling distribution to the best advantage. One of the first results of cooperation should be the improvement of the product. Next comes standardization. Not only should the product be a good pro-

duct, but it must also be graded according to the desires of the ultimate purchaser. The next step is branding the product and educating the consumer to appreciate the excellence of that particular brand. Small growers working independently can do little along this line. Cooperation is necessary to bear the expense of advertising.

If the farmer does not use care in marketing, and good judgment in regard to the nature of the produce he markets, he may not only receive insufficient returns for his labor, but by the growth and removal of bulky crops may also lessen materially the productive power of his soil. Enough plant food should be returned to the soil to make up for that which is taken away. The people of Wisconsin were forced to abandon grain farming, and go into dairying and the manufacture of butter and cheese on account of the constant decrease in soil fertility that was taking place under the old system. They found cooperation to be the best means of producing a standard product and to marketing it at the least expense. Every farmer should make sure that the system of farming he is practicing is a permanent system and not one that will in the end exhaust the land.

HIGH vs. LOW MILK PRODUCTION

C. R. Haynes, '18

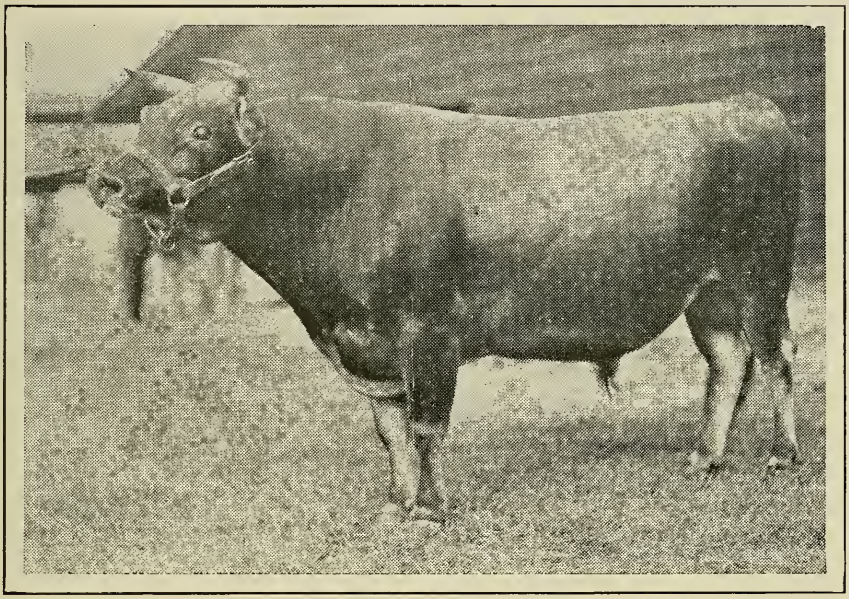
Almost every dairyman understands that the domestic cattle of the world have probably descended from one parent stock, but that variation began at a very early period and at the present time each of the various recognized breeds of domestic cattle may be satisfactorily placed in one of two great classes disignated, respectively, as beef cattle and dairy cattle. Yet some of the dairy breeds have already made an impress upon the meat stock of this country, and promise to be of value in promoting dairy interests.

While cattle have been bred for dairy purposes for more than a century, marked improvement in milk yields and butter fat production is of comparatively recent date. Within the last two decades an accurate system of testing the milk and butter fat capacity of dairy cows has been inaugurated, known as the Babcock test. We now have the record of thousands of dairy cows, going back several generations. This data, accurately collected and properly interpreted, furnishes valuable aid to breeders and dairymen in selecting their animals.

If the United States statistics are accurate, the average barnyard cow of the United States produces about 3,646 pounds of milk and about 132 pounds of butter-fat in a year. If we compare this with the amount given by the best producers we will see which is the efficient cow. The records of modern cows are almost unbelievable, if one is not familiar with the progress of dairy breeding.

One-, seven-, or thirty-day tests will not be considered here, as breeders do not regard them as being of as much value, because a cow can be made to give richer milk than normal for her by certain processes, and by proper feeding and care can be made to overdo for a short time. It is what she can do from one freshening to another, or in a full year, that tells what she can be relied upon to preform. And it is her ability to keep that up year after year that makes her of value as a breeder. The record of production has been broken several times in the last few years and at the present time a Holstein-Friesian cow, Tilby Alcartra, has a record of performance of 30,451.4 pounds of milk, or about eight times the amount produced by the average cow in one year. Another cow of the same breed has produced 1,205.09 pounds of butter-fat—I refer to Duchess Shylark Armsley. There has been an increase of 90.4 per cent in butter-fat records of world beaters in twenty years.

Perhaps some think that these two specimens are the only ones that are worthy of mention in the roll of honor. But to prove that these high-bred dairy cows are not freaks—there are thirty-five Holsteins in the seven different classes under which dairy cattle are tested—from aged down to youngsters—that have an average of 23,528.6 pounds of milk and 847.6 pounds of butter-fat each, in one year.



Raleigh's Noble No. 90,478

JERSEY BULL

Grand Champion at Tennessee State Fair, 1915. Owned by Jesse M. Overton, Nashville, Tennessee

Thirty-five leading Guernseys average 15,152.5 pounds of milk and 795.5 pounds of butter-fat. Thirty-five highest Jerseys average 14,013.2 pounds of milk and 742.85 pounds of butter-fat. This includes five top-notchers from each of the seven classes of each breed.

There are bright prospects for better averages than these, for the average per cow of the ten best two-year-old in each breed for a year is:

Breed	Pounds of Milk	Pounds of Fat
Holstein	20,200.19	771.3
Jerseys	12,193.57	656.1
Aryshires	14,021.3	554.1
Guernsey	13,056.54	697.5

These two-year-old records of today are about as good as the records of mature cows five or six years ago. And again, the records show that there is a tendency toward holding out to ripe old age, which is not believed by some who claim that dairy cows are "burned out" by pushing for production. The five highest records of each breed for a year for cows over ten years of age show that the Holstein has an average old record of 23,469.8 pounds of milk and 781.4 pounds of fat; the Guernsey average 15,303.9 pounds milk and 730.9 pounds fat, and the Jersey average 12,500.9 pounds milk and 664.6 pounds of fat, proving that high-producers hold out to old age.

After we see the possibilities of high milk and butter-fat production, naturally the next question to arise would be whether or not the net profit from the high producing cow is more than that from average producing cows, or is milk and butter produced more economically from high producing cows than from the average. To answer this question we will have to determine what it costs to keep a cow per year. This differs with the different sections of the country and with the high and low producing cow. However, the chief thing is the difference in the cost to keep a high producing cow and a low producing cow. Upon investigation by several of the experiment stations, they found that the average cost of feed for producing milk is:

Production per year (Pounds)	Cost of Feed per Year
2,000- 5,000	$40- 50
5,000- 6,000	50- 60
6,000- 7,000	55- 65
7,000- 8,000	65- 80
8,000-12,000	75- 85
12,000-16,000	85- 95
16,000-20,000	95-110
20,000-30,000	110-180

It is, of course, recognized that the cost of feed, while the largest single item, is only one of several that go to make up the total cost of milk production. It is an exceedingly difficult matter to give a fair estimate of the factors entering into the cost of producing milk and milk products. The best estimates and most complete figures on this subject of the cost of milk production in addition to the feed are given by Professor Rasmussen, of New Hampshire Experiment Station, and by Ex-Governor Hoard. They estimate that the cost of bedding, keep of bull, labor, interest on money invested in cow and barn, together with depreciation and taxes, light, veter-

inary services, ice, etc., to be $50 per year in addition to the feed.

Then, according to the above, when a cow is yielding less than 3,500 pounds of milk per year there is no question about the absence of profit. We can also see that the cost for feed plus fixed charges, for cows producing even more than this will leave a loss for the owner to bear as a reward for his enterprise.

Professor C. H. Eckles, of the University of Missouri, thoroughly investigated the cost of producing milk for the different producing cows and found that cows producing above 10,000 pounds of milk did so at a feed cost of around 80 cents per hundred pounds, the cow producing from 6,000 to 7,000 pounds did so at a cost of about $1.10 per hundred pounds, while the cow producing 5,000 pounds cost about $1.20 per hundred pounds and those producing under 4,000 pounds did so at the exceptionally high cost of $1.86 per hundred pounds, or at a cost of over twice that of the cow giving 10,000 pounds. Low-producing cows, those that produce less than 4,000 pounds of milk, are the cows that show very high cost of production, and it is only necessary to have a few animals of this kind in the herd before the chances of running the business at a profit are gone. Whenever figures have been collected regarding these facts, the wide variations of income, as pointed out, have been found. There is one fact, however, that always stands out strikingly—that economical production is found only with high producing cows.

To prove this statement we can take the two highest producers of each of the five leading dairy breeds. We find the average milk production for the ten high producing cows is 22,904.7 pounds of milk and 944.5 pounds of fat. If this 22,904.7 pounds of milk was sold at the customary price, 10 cents per quart, it would sell for $1,140. The average cost of feed and "fixed charges" was about $175 which would leave a net profit of $965 each—minus the cost of marketing. If the butter was sold from these cows the profit would be less, but still a large one and the skim milk could be kept on the farm. The milk from Tilly Alcartra, if sold at 10 cents per quart, would bring $1,416.41; and when we subtract the cost of feed from this, which was $196.74, we would have a nice balance of $1,219.67. The calf from a cow like this would certainly pay the "fixed charges." By reducing Tilly Alcartra's milk to quarts we find that she produced milk at a cost of 1.4 cents per quart. This proves beyond a doubt that high producing cows pay far better than the low producing cow, in fact the low producer does not pay for her feed.

It has been noticed that in each case the high producing animal used more feed. This is inevitable. We often hear men who know very little about dairying say that it costs as much to keep a poor-producing animal as it does a good one. This is true only in regard to certain items of "fixed charges," but is not and cannot be true with reference to feed. Naturally the large producer must have more

feed, and the fact that she is able to utilize a large amount of feed is the reason why she is a more economical producer.

We will take a table published by Professor Eckles on the use of feed by cows of different producing capacities, to prove more clearly where the economy of production comes in with high producing cows, the table is:

Use of feed by cows of different producing capacities.

Cows giving 4,500 pounds of milk—60% for maintenance and 40% for milk.

Cows giving 9,000 pounds of milk—40% for maintenance and 60% for milk.

Here, maintenance is the amount of feed necessary to support the animal body. The cow producing 4,500 pounds of milk used about 60 percent of her feed to support the body and about 40 per cent is used for milk production, while with the cow that produces 9,000 pounds a year the condition is reversed.

They both use about the same amount of feed for maintenance, but the high-producer uses about 25 per cent more feed, which it is easily seen, gives her twice as much feed available for milk production. The economy in the high producer lies in the fact that she is able to use profitably a large amount of feed after enough has been provided for the maintenance of the animal. It was not the difference in digestion of feed that caused the difference in these two classes of animals, but an inherited factor to profitably utilize a large amount of feed.

Certainly the high-producing cow is the efficient one. One should not need be asked, how many cows do you keep, but rather, how many cows do you have that keep you? Keeping cows and cows keeping you are quite different. We have too many men keeping cows, what we must have, if we are to continue the business on a profitable basis is more cows that keep us.

THE FIRE BLIGHT

N. I. Hancock, '17

The fire blight (apple and pear blight) has spread with such rapidity over Tennessee within the last few years that, according to reports from the Extension Department, this disease may be considered a common enemy in every section of our State. The fire blight has never been seen in Europe, and it is thought that this disease first occurred on wild crab-apple and hawthorn in eastern North America. It was first reported in 1780 among the Hudson River Highlands of New York state, and since this time, outbreaks have been recorded in all parts of the United States.

The disease may affect the blossoms, the twigs, and the fruit; or it may form cankers upon the trunks of the tree; and again, it may girdle completely the body of the tree and become known as

body blight. Thus, fire blight is the common name for the same disease known as blossoms blight, fruit blight, twig blight, sun-scald canker, blight canker, and body blight. The fire blight attacks the pear, quince, apple, apricot and plum, while Waite reports on its common occurence upon evergreens in Florida, Georgia and California, and it has also been found upon the red berried California holly where this native species is in the vicinity of cultivated orchards. The cherry and peach are not known to be attacked.

Cause

The cause of fire blight was attributed by Coxe (1817) to the rays of the sun; while according to the observations of Patrick Barry, the ambrosia beetle (Xyleboeus dispar) was the direct cause. At a later period the fungus theory was advanced by J. H. Salisburg, but the real enemy was not found until 1879, when Professor T. J. Burrill discovered that the true cause of this disease is a bacteria. This organism is called Bacillus amy lavoaus, and is of variable widths, from .6 to .7 U. mn.; and in length from 1.5 to 1.7 U. mn. According to observations this organism is cylindrical with rounded ends, and the cells are found usually single, often in pairs and seldom in chains.

It is motile by means of peritricbic flagella, and stains with alcoholic solutions of glution violet, carbal fuchsin, and methylene blue. Experiments carried out by D. H. Jones of the Ontario Station and by W. H. Whitzel of Cornell Experiment Station show that the death point of this bacterium is 47 degrees c.; the optimum temperature is between 22 and 25 degrees c.; the minimum temperature is from 14 to 16 degrees c. Cells were subjected to a freezing temperature for fourteen days and were found to give growth after 36 hours at 23 degrees c. No endorporia have been observed.

Spread

The Bacillus amy lovorus lives within the cells of the inner bark, but observations do not agree with regard to the manner in which the bacteria move within the tissues. According to one theory the bacteria are most abundant in the intercellular spaces, and the cell walls are broken by a mass action of the bacteria; or the oscicotic pressure of the substance in which the bacteria are found is sufficiently great to rupture the cell walls; again the bacteria may dissolve their way through the cell walls by chemical secretions, and lastly, there is the possibility of their entrance due to some toxic or engymic action. The succulence of the tissue is the primary factor in the liability to infection by the bacteria, and with the advent of spring growth and increased temperature of the spring, an ideal medium is obtained for its growth. Sometimes the bark will become blistered, and upon such blistered areas there will be present the somewhat dried remains of a gummy secretion exudate. This gummy oozes through the bark, and on first appearance is transparent, but as it becomes oxidized

an amber color and finally a reddish brown color is seen. This exudate is literally crowded with the germs of this disease. When the organism is especially active, this exudate may become so abundant that it flows slowly down the sides of the tree, and finding some injured place upon the trunk infects it and forms a canker. The bacteria will live over winter in the living bark immediately surrounding these dead cankered areas. At the Cornell Station, out of a total of 83 infected twigs examined, 21 contained living bacillus amy lovorus, and at the Ontario Station 30% of the infected twigs examined showed living bacteria, which proves that the organism is also carried over winter in small twigs and limbs. If the parasite has established itself in the nectary of the blossom, the tissues of the flower soon become diseased, and within a short time the characteristic symptoms of blossom blight are apparent. Waite has proven beyond doubt that the disease is carried from tree to tree upon the legs and uncouth parts of bees, flies and other insects, also at the Ontario Station it has been found that the aphid (Aphis mali) and the fruit bark borer (Scolytus rugsclosus) are two agencies which spread the disease, especially among nursery stock. Pure cultures of the Bacillus amy lovorus have been obtained from the punctures made by the aphid upon young trees.

Prevention

Because of the nature of this disease and the many agencies which spread the bacteria, it is evident that few preventive measures can be employed. We know that the bacteria are most active within the tissues of the growing wood, and as yet no spray has been found which will combat the organism successfully. We have observed also that the organism is most active in young growing wood, then those orchards which are cultivated and fertilized naturally produce more young growth, are more sappy, and therefore, more susceptible to the blight than those trees which are in sod and are not cultivated. Hence, we may say that where the disease is prevalent in our community, we should leave our orchards uncultivated and retard growth as much as possible.

Since we are unable to destroy the bacteria by spraying, then the only effective method that we may employ is that all diseased parts of the tree should be cut out and the portions cut off should be burned. We should continue this pruning through the summer and late fall so that no diseased parts shall remain upon the tree as a home for the bacteria to pass the winter. Since the organisms have been found 6 to 8 inches below the portion which showed the first sign of the disease, it is necessary that we cut six inches to one foot below this area. The best time for systematic action in cutting out blight is the late fall or early winter. The pruning knife, saw, etc., may have come in contact with the disease and become a potent carrier. Therefore, we should always sterilize our tools after cutting at

one diseased portion, before we attempt the prunning of another diseased part. Formalin applied with a small swab may be used successfully for this work because it does not injure the steel tools.

Since the fire blight is a bacterial disease, and diseases of a similar nature have been combated successfully by finding disease resistant varieties, so attempts are being made to obtain varieties which are resistant to the fire blight. This variety has not been found, and surely the concerted action upon the part of all orchardists should be obtained in order that we may control this disease of our plant kingdom just as the foot and mouth disease among animals has been controlled.

COOPERATIVE HANDLING OF LIVE-STOCK

J. C. Grimes, '16

One of the most vital problems which confronts the American farmer of today is how to realize a larger return from his products. This does not necessarily mean that the consumer is to pay more for the things which he buys, but that more direct and economical methods are to be used in their distribution. At present from fifty to one hundred percent is charged by the different agents who handle the products between the producer and the consumer. Now, the question with the farmer is, how to do away with so many middlemen; and so secure for himself these profits which he justly deserves.

This can be brought about in only one way, and that is by cooperation. The scarcity of land and the rapid increase in population has for sometime necessitated cooperation among the European farmers; but in this country, we have not as yet fully realized its importance, and are, in most instances, meeting single handed the problems which concern us all alike. It is only in very few instances and to a limited extent that our farmers cooperate at all.

Probably one of our greatest needs for cooperation in any field today is in that of the handling of live stock. Within the last decade there have been quite a number of societies organized for this purpose in Wisconsin, Maine and Minnesota; and they have been meeting with much success. These organizations usually centrallize around creamery or cow testing associations; or they may be developed independently. The work may take two forms—that of the breeder, of that of the shipper.

If the breeds are to be improved and only a few men wish to cooperate in the establishing of better herds, then they should join in the purchase of sires of the same breed, unselected and of the same individuality; but if the work is to be taken up on a larger scale and a cooperative society formed, then the organization should be incorporated and a constitution and by-laws should be drawn up. There are four fundamental laws

which have been laid down for success in the organization of a cooperative breeder's society: 1st, The cooperators must decide to raise only one breed of live stock.

2nd, at least three breeders should enter into an agreement to exchange sires at the end of two, four and six years, respectively.

3rd, these sires should be selected from herds bearing no relationship in order to prevent in-breeding.

4th, the animals should be of the same type in order to get uniform results.

The advantages of such work is evident: The breeders of any one community can secure hight-priced breeders for their herds. It gives advertisement to the breeders and to their cummunity. It attracts buyers, and is of an advantage in shipping which will be taken up later in this article.

In the past, individuals have built up high grade herds and have improved certain breeds of stock but the American farmers as a whole have not been affected by improved methods. To get results as a breeder, one must have a knowledge of the fundamental principles of animal improvement; and the average farmer is not well enough qualified to apply these principles. Under the cooperative methods, a systematic breeding plan can be adopted, and the work can be organized under a common leader who is a specialist. Thus, each individual in the community helps his neighbor, and in so doing helps himself.

The other line of cooperative work in the handling of live stock of which we wish to speak, is that of the shipping associations. These are organized in much the same way as the breeders' societies, which we have already described. Minnesota is the leading state in the Union in this work. In 1914 she had 115 such societies, and it was figured that each one saved its members $1,000 per year.

The old methods of marketing live stock, where the buyer comes around to each farmer and gathers up the animals, or where the stock are driven to the local market, has proved very unsatisfactory. Both methods puts the farmer to a disadvantage: 1st, because the buyer is much better informed on market prices than is the farmer and will rarely ever pay the price he should for the animals. 2nd, the buyers organize and the farmer is forced to sell at a low price or drive his stock back home, which he can hardly afford to do.

It is very essential that farmers cooperate if animals are to be sold at the right time, shipped to best advantage, sent to the right market, and disposed of at the right prices.

The Farmers' Shipping Association of Weeks County, Minnesota, found that the present charge for shipping hogs is 33 to 35 cents per hundred, for cattle 23 to 30 cents per hundred, while the cost of operating their cooperative office, including the manager's salary is only 6 cents per hundred. It costs only 2 dollars to ship a car of hogs through the association, whereas the cost under the old plan was 30 to 80 dollars per car. Their cost for handling twelve hundred-pound

cattle is seventy-five cents, which is only twenty per cent of the original cost. During the first year this association shipped fifty-seven cars of stock, doing a total business of $59,231.04.

Very little capital is required for a shippers' association. If the business is not large enough to make a shipment each day, then certain days of the week are set aside for the members to do their shipping. The manager is notified as to how much stock there is to be shipped, and he has cars there ready. Stock of several farmers may be shipped in the same car, but they are sold separately. The price received, less the actual shipping expenses is returned to the members.

NEWS

The Fourth Annual Banquet of the Agricultural Club was held at the Imperial Hotel on the night of March 10. Plates were set for 200. This was the most successful banquet that has been held and everyone enjoyed the evening very much. Music was furnished by the University Orchestra and by the Club Quartette. Among the distinguished guests who were present and spoke were Mr. G. R. James, of Memphis, and President Peyton, of the N. C. & St. L. Railroad. Gov. Rye and Supt. Sherrill were invited but were unable to attend because of urgent business. Prof. C. A. Keffer acted as toastmaster. Mr. S. G. Abernathy responded to the toast "Ten Years from Now." Miss Mabel Wheatley spoke on "The Home Makers." Members of the faculty who spoke were Dr. Ayres, Dean Hoskins, and Prof. Morgan. Col. Tyson, of Knoxville, was present and made an interesting talk.

Prof. O. M. Watson, of the Horticultural Department, was called home on the 21st of March because of the illness of his mother. His home is in South Carolina.

Miss Moore, of the Division of Extension, just returned from Greene County, where she has been attending community meetings, and women's club meetings. Supt. Joel L. Pierce and the members of the County High School Board, also attended the meetings, and showed much interest in the work. Miss Moore says splendid reports of the Girls' Club Work and the Women's Work are coming in from all over the State.

Saturday, March 25, a joint meeting of the Farmers and their wives and daughters of Monroe and McMinn Counties was held. The meeting met at Reagan, a station near the line between the two Counties.

A very successful meeting of the county agents of East Tennessee was held at Chattanooga, March 17 and 18. They came together for the purpose of getting a line on their work for the coming year, report on progress of work, and discuss plans to be carried out during the spring. Saturday afternoon all the county agents and the supervising agents visited several

demonstration farms in Hamilton County.

The Division of Extension is employing an editor, who will begin work April 1. Mr. Harry B. Potter, now with Farm and Fireside as managing Editor, will fill the place.

Miss Isabel Hayes of the State Educational Department recently visited in Knoxville and East Tennessee.

Miss Eloise Ward, of the North Division States Relation Committee, Washington, D. C., is visiting in East Tennessee and making a study of Southern Conditions and organizations in the rural districts.

Miss Ambrose, District Agent in Home Economics for East Tennessee, was recently in Carter County helping arouse interest in the Canning Club Work.

The Jefferson and Hamblen County Cow Testing Association is proving very profitable to the members. This Association was organized by C. A. Hutton, Dairy Specialist of the Division of Extension, in December, 1915, and is composed of 25 of the most progressive dairy farmers of these two counties. Records are being kept on over 400 cows. As an instance of the results obtained, Mr. Hutton just visited one man who has increased his net profit on a herd of 35 cows from $5.50 in January to $68 in March. Another increased his net profits $27 on a herd of 25 cows in one month.

Miss Conway, Specialist in Home Economics, has been in Lincoln County aiding in community meetings, and the organization of clubs.

Through the efforts of the dairy agents of the Division of Extension, three new cream routes have been established for sending cream to the creamery at the University Farm. The agents are now working on three other routes and hope to have them in operation soon.

C. A. Hutton, Dairy Specialist, was in Lebanon the last of March, attending a meeting for the organization of a cooperative creamery at that place. Wilson County now ships about 15,000 lbs. of farm butter per month, because there is no creamery.

A new creamery has just been opened at Pulaski in Giles County. This will furnish a market for the dairy products of the farmers of that section.

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EDITORIAL

Lest they forget, we would call the attention of our readers to the Annual East Tennessee Farmers' Convention, which comes off the latter part of May. It is hoped that the farmers are making preparations now to attend that most important gathering. Each year the attendance has increased and this ought to be the banner year of them all.

The question of diversification of crops in our southland is one of great importance. Notwithstanding the fact that much has been written and said concerning this diversification for the last few years, there is yet only a small change in the amounts of the various crops raised. It is true, there are slight changes in crops going on and these seem to mark a tendency in the right direction. In looking over the monthly crop report of the United States Department of Agriculture from 1910 to 1914, it is seen that the average acreage of cotton for the ten Southern States varied as follows: 31,496,000 in 1910; 35,024,000 in 1911; 33,341,000 in 1912; 36,051,000 in 1913; 35,669,000 in 1914; and 29,988,000 in 1915. During the same period, there was a corresponding variation of corn and other crops. Of these other crops, wheat, though small in acreage, showed a gradual increase from 3,203,000 acres in 1910 to 4,595,000 acres in 1914, and a further increase to 6,450,000 acres in 1915. Oats showed an almost parallel increase, moving up from 3,036,000 acres in 1910 to 5,836,000 acres in 1915. In hay and other crops of less importance some, but not very marked changes in acreage occurred. Hay had an increase in acreage from 2,373,000 in 1910 to

2,931,000 in 1915, while rice, tobacco, and potatoes showed little change. Corn seems to be the complementary crop to cotton in the South. Its acreage varied as follows: 30,719,000 in 1910; 31, 833,000 in 1911; 32,572,000 in 1912; 31,826,000 in 1913; 30,724, 000 in 1914; and 34,435,000 in 1915. Thus it will be seen that the acreage of corn increased or decreased in proportion as cotton decreased or increased respectively. Yet the areas devoted to cotton and corn taken together and compared with the total acreage in crops, shows a decrease for the five years, and gives us the surest indication of crop diversification.

From the report it is seen that the percent of cropped area devoted to corn and cotton combined ranged gradually from 86.9 in 1911 to 78.8 in 1915. This is largely explained in the increased acreage in wheat, oats, and hay. It must be remembered that tradition is hard to break, that the single cropping system has long been in vogue, and that business of the South has grown up largely to conform to this system. In the light of these facts, the above figures give very encouraging evidence that the change to a diversification of crops is on in the South.

Farmers are the only people on earth who reverse the processes of organized business to the extent that all they produce is sold at wholesale while all that is bought is purchased at retail prices. In this way organized capital receives the profits going and coming. Business men know that their only chance for profit is to buy at wholesale and sell at retail. In some progressive sections of the country the farmers are learning that they can pocket some of the profits on their own products and commodities through the application of organized business methods. Certain cooperative creameries and other farmers' organizations are already buying for their members at wholesale such articles as food, wire, farming implements, fertilizers and other articles needed on the farm. On the other hand cooperative marketing associations are in some instances replacing the middle man and commission merchant by establishing direct connection between the country producer and the city consumer. In this case the consumer pays only for the cost of distribution plus the cost of production, there being no profits on distribution. Under this system the consumer pays less for the food while the farmer receives more for his product. The development of this system of marketing will in a large measure solve the problem of the high cost of living, which is now perplexing the people of our larger cities.

The conditions outlined above cannot be brought about by any one farmer, nor by a few farmers working independently here and there; but they can and must come as a result of the united efforts of entire neighborhoods closely consolidated in some cooperative enterprise. In some towns as at Winchester and Murfreesboro this unit of organization is a cooperative creamery; in others as at

Harriman it is a cooperative egg shipping association, in still other communities there are cooperative cow testing associations. It matters not so much what kind of an association is formed—that will depend upon the products and interests which predominate in a given community. The important thing is to get some kind of cooperative movement on foot so that the system of organization and method of operation may be demonstrated. After it is once thoroughly understood in a given community the movement is sure to grow and other organizations are likely to follow.

Of particular interest in Tennessee are the cooperative insurance companies. Upon investigation it was found that for $100,000 paid out in premiums at the rate of $15.00 per thousand the paid losses amounted to only $10,000, leaving the farmer minus $90,000 on the deal. Of this amount about $20,000 goes to agents and the remaining $70,000 to New York, Hartford, Conn., and other places, never to return. In answer to the question "who pays?" the farmers decided that they were the ones who were footing the bills and that the bills were too high, so in several counties they organized and began operating their own insurance companies, dividing the actual losses equally among themselves. Some said it would not work but experience has proved that it does work. There are now twenty-four of these cooperative insurance companies in Tennessee, most of them located in East Tennessee. Not one of the companies has failed, and the premium rate, instead of $15.00 per thousand as paid to the old time companies, is on the average for those companies only $3.00 per thousand. Some of the companies have a record of two years without a fire loss. In that entire time there was of course no loss or premiums to pay. It looks like a very sensible proposition and the farmers who are enjoying the benefits and protection of such a system find that is so.

It is a good sign to see the spirit of cooperation thus developing in Tennessee. Where such a spirit reigns there are the farmers prosperous, progressive and contented. The system is right. It works in some communities, why not try it in others?

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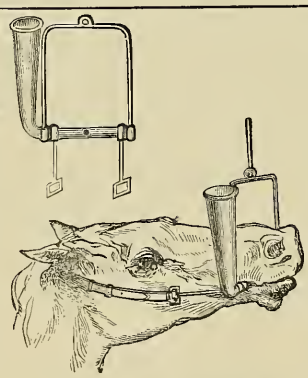

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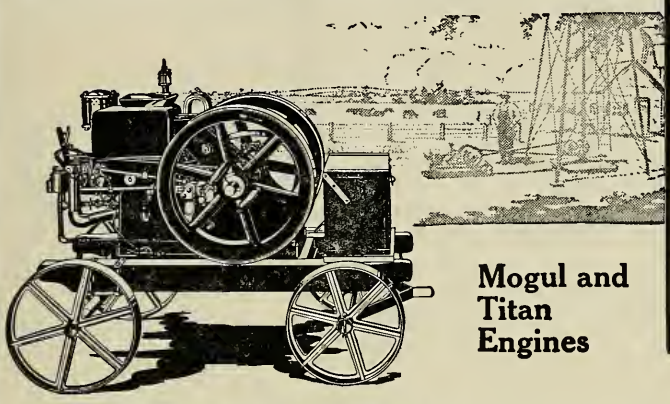

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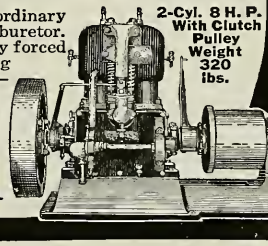

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It must be pure; it must be all carbonate of lime, and not a mixture of inert substances of no particular value.

It must be ground to a degree of fineness that will cause immediate chemical activity and release the Potash, and at the same time contain a sufficient number of larger particles to remain in the soil to benefit the future crops.

Columbia Ground Limestone meets all such requirements, and is a sure, dependable and cheap means of supplying Potash to your farm.

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Circular No. 149, Agricultural Experiment Station of University of Illinois, Urbana, Ill., backs and supports every one of these statements, that now, in the face of the Potash situation, are of real and prime importance to every farmer or orchardist receiving this sound business advice.

Remember, you are after Potash, the absolute requisite for large and successful crops. Obtain your Potash without cost by using Columbia Ground Limestone, the direct functions of which, alone, return its cost many times over, leaving you the released and available Potash as a by-product, FREE.

You can thus see why we ask you to think sanely, and to save the money that can be put into improvements and other practical purposes, increasing the value of your farm and furnishing you with many desirable comforts.

WRITE US TODAY

Do not delay in asking the price of Columbia Ground Limestone, delivered to your station. We will promptly advise you of the price requested, and at the same time send you, without charge, a copy of our pamplet on the easy construction of a Home-made Limestone Spreader.

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MAY 17 1916
College

THE U. T. FARMER

COWPEAS AND CORN IN TENNESSEE

Vol. X MAY, 1916 No. 8

Published Monthly By

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UNIVERSITY OF TENNESSEE

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Contents

Page

Cherokee Song ---------- 226

Care of the Spring-Born Calf ---------- 227
H. R. Duncan

Cooperative Cow-Testing Associations ---------- 229
L. S. Hale, '18

Grape Culture ---------- 231
J. M. Greer, '17

Sheep in Tennessee ---------- 234
Dick Boyd, '18

Care of the Mare and Foal ---------- 236
A. J. Dement, '19

Home Economics Extension Work ---------- 238
Miss Ruby McSpadden, '17

The Time to Apply Fertilizer ---------- 239
L. C. Pace, '16

Timely Topics ---------- 243
U. S. Department of Agriculture

News ---------- 244

Editorial ---------- 247

Farmers' Convention Program ---------- 249

CHEROKEE SONG

Composed by S. G. Abernathy and A. J. Winegar
Tune "Kentucky Babe"

Now Cherokee belongs to the State an' ole U. T.;
Praise our County Court!

Morgan am a'smilin', jes' as happy as can be;
Praise our County Court!

Soy beans, alfalfa too, an' silage am our crops;

Punkin pie, an' apple sass, an' pork to make our chops.

(Refrain)

Shorthorns am a'lowin',
De clover am a growin',
Pigs am squeelin' too—
Wee-e-e-e-e-e.

Come an' git yo' buttermilk; come an' git yo' corn—
Wee-e-e-e-e-e;

Calfie hears its mammy in de lot across de way—
Moo-oo-oo-Moo-oo-oo;

Supper's comin' soon.

De business men o' Knoxville am right behind us now,
An' our Governor too!

Railroads am a'helpin' jes' as much as dey know how
T' make our dreams come true!

Den let de State jes' demonstrate what modern farmin' means,

An' watch ole Morgan wid his men grow hogs an' soy beans.

(Refrain)

THE U. T. FARMER

Vol. X | MAY, 1916 | No. 8

CARE OF THE SPRING-BORN CALF

H. R. Duncan

Fully seventy-five per cent of all the calves produced each year in Tennessee are dropped in the spring. Spring freshening of cows is the common practice throughout the State. This practice is followed, not because of any special advantage to the calf or for better prices received for the milk and milk products, but probably because the spring season is the natural time for cows to drop their calves. This, however, does not mean that spring born calves are more profitable or that the practice is commendable.

No hard and fast rules can be laid down for the management of cows and calves in this State or any other state because of the great variety of breeds, types of farming, farms and business conditions encountered. But for the average farmer, the practice of having the calves dropped in the fall should be recommended for the following reasons:

First, the general farmer derives part of his income from the sale of milk, buttermilk, cream, butter and butterfat. Prices for these products are at least 20% higher during the winter than during the spring and summer months.

Second, the farmer has more time to milk his cows, make butter and market his dairy product during the winter than during the spring and summer, when he should devote as much of his time as possible to his farming operations. This plan makes it possible for him to use his labor to advantage the year round and not have to lay off his men when corn is "laid by."

Third, during the winter more time is available and the average man is more inclined to feed and take better care of his calves than during the summer when a few sprigs of grass can be seen in the field. Practically as good a ration can be had in the winter for the young calf. The calf's stomach and other digestive organs are adapted to handle concentrated feeds such as milk and corn meal, which, combined with a small amount of hay, makes an ideal ration. The capacity to handle bulky feed, such as grass and hay, must be developed gradually to the point where the calf can handle enough to support its body and supply a surplus for growth and development. Hence the fall-born calf has a distinct advantage over the spring-born calf when it is put on pasture; for it has had the time and the opportunity to have developed its digestive organs and

capacity so that it can utilize grass to advantage.

The most serious mistake which the average farmer makes with his spring-born calves is that **of weaning them too early and then expecting them to live entirely on pasture.** If men could realize that a calf weaned suddenly at three or four months of age and probably without any grain in connection with its mother's milk, is not prepared or cannot adapt itself to so sudden a change of feed, our calf crop would be worth several thousand dollars more per year. This mistake, combined with the fact that young calves are annoyed by the flies and suffer a great deal from the heat of the summer, explains why so many of our spring-born calves look so scrawny and runty in the fall. It is poor policy to stunt a calf. A calf or any other young thing should be kept growing and in a good thrifty condition. When a calf stops gaining or goes back you are losing; for the feed consumed is used for maintaining the body—not for growth. The best plan to follow is to keep the calf growing from birth to maturity. The first eight months of the calf's life are the most critical; if it successfully passes this period chances are in its favor.

In general, calves should receive some grain for the first six months. Corn meal, cracked corn, or whole corn after the calf is two months old, is the cheapest, and most ideal grain ration. It is cheap, available on the farm and makes a balanced ration with milk. Calves will begin to nibble at grain when about two weeks old if it is placed before them or they have a chance to eat with older ones.

It is a good plan to keep the young calves in a dark, cool stable during fly time, giving them the run of a grass lot at night, mornings and evenings. If possible, a lot of sufficient size located near the barn and sown to clovers and bluegrass should be provided for the calves. If given a lot of this kind in which there is plenty of sweet, nutritious grass, with whole milk or skim milk and a maximum allowance of 2 lbs. of corn meal per day there is no reason why spring calves cannot be grown as cheaply, or as large and as thrifty as fall calves.

Where beef raising is carried on extensively and the calves allowed to run with their dams a creep located at the watering place or near the bedding ground, in which grain could be placed daily at regular hours would prove a profitable investment. In this instance beef and not milk is the prime object so perhaps spring-freshening would be most desirable.

The average farmer who raises calves and sells milk and butterfat **should by all means have his calves dropped in the fall,** for the chances are he will develop better calves and get more for his milk product. There are, however, instances where spring-freshening is desirable. In either case, especially with the springborn youngsters, more intelligent feeding and management of the calves is demanded if the greatest profit is to be derived.

COOPERATIVE COW-TESTING ASSOCIATIONS

L. S. Hale, '18

Perhaps no other single force of recent years has done, or is now doing, more to place the dairy business upon a thoroughly efficient working basis than the cow testing associations. For many years following the invention of the milk tester by Dr. Babcock, of Wisconsin, the practice has been for each owner to make his own tests, or else have his milk tested by the creamery which purchased it from him.

But in the past few years the idea of having herds tested regularly by groups, or associations, has originated and is growing rapidly. A dairy testing association consists, usually, of twenty-seven or twenty-eight members duly organized and officered. Each member must be a herd owner. The association employs an official tester. The tester's duty is to make regular visits to the herds represented in the association and spend at least a day with each one. He makes an official test of each cow; notes the amount and kind of feed given to each one; the value of the milk produced as compared with the value of feed consumed and tabulates all items of expense or credit for each cow. He is thus able to furnish the owner with an absolute check on each cow in his herd. At the same time the tester can, with his accurate data, recommend to the owner any necessary changes in feed, care, management, etc. In this way the unprofitable individuals are soon discovered and disposed of.

It is the purpose of the associations as nearly as possible to have the membership of each organization limited so that the official tester can make a complete round of all the dairy herds in the association once each month. The usual custom of defraying expenses of the organization is to assess each member one dollar per cow per year with a minimum charge of twelve dollars per herd per year. This insures to the organization a sufficient income to pay the salary of a competent tester and to meet any other necessary expenses.

The advantage resulting from these dairy testing associations are many. It results for one thing in a general clearing up of the actual record of any cow or herd in the association. So long as the owner himself makes his own tests there is sometimes a tendency on the part of some of his neighbors to suspect that the accuracy of the test was affected slightly by the owner's interest. But the work of the disinterested official tester removes this possibility, and each cow is rated exactly according to her actual production record.

The history of the dairy testing association has shown, also, that when they are properly conducted the cooperative principle soon extends to other phases of the business. Thus the necessary dairy supplies such as feed, equipment, etc. are purchased together for the whole association. This in itself is a great help to the dairyman, but there is an equal benefit to the as-

sociation's members resulting from their cooperative marketing.

The marketing of the products of the dairy testing associations is frequently one of their greatest advantages. When an association has been in existence a very few years the general herd production shows a marked increase due to the elimination of the inferior stock and the introduction of pure breds. This increase of production is one of quality as well as quantity with the result that the association's products show a very desirable rise in market value. Aside from the improved quality of the dairy products, however, is the fact that the official tester is able to suggest better methods of preparing the milk, cream, butter or cheese for marketing. This feature alone adds greatly to the value of the association's products in the market.

In marketing any line of finished products uniformity of package, quality, weight, etc. is one of the first essentials. Here again the value of the cooperative marketing phase of the testing association is evident, for the tester with his knowledge of market demands can teach the proper methods of preparation of the various dairy products for market.

Not the least of the advantages to be derived from the organization of a testing association is in the purchase of dairy herd sires.

Securing dairy sires from the most prominent and highest producing herds is one of the items of heaviest expense to the individual dairyman. But by purchasing the sires through the testing association the expense is distributed among the members so that there is no financial burden on any one.

The cow testing association idea is comparatively new in Tennessee. Hamblen County is the pioneer in this movement in Tennessee; and though the organization is but a few months old, indications so far all point to its being the complete success that similar associations are in other states. As the work progresses and the good results become more evident there will doubtless be many more associations organized. It is to be hoped that the movement will spread rapidly, for Tennessee is far from being the dairy state it should be. Thousands of pounds of dairy products are shipped into Tennessee each year from other states. All of these should be, and could be easily produced at home.

The weakness of so many organizations, other than dairy testing associations, is that there is frequently a tendency on the part of some to drop out soon after organizing. The history of the dairy testing associations, when properly conducted, has shown that there is very little dropping out of members. The good results are so soon apparent to every one that it is seldom that a man really interested in dairying leaves the organization. It frequently becomes necessary to organize new associations to provide for all those in a neighborhood who wish to join, since the membership must necessarily be limited. For the best results an association membership should not be so large as to pre-

vent the tester from making a complete round of all the herds in the association every month, spending on the average one day with each herd.

Undoubtedly the organization of a dairy testing association is one of the greatest stimulants that can be given to the dairy business in any community. The idea is exactly the same as that found in large manufacturing industries in the cities where efficiency experts are employed to search for small losses in the business. Furthermore the people in rural communities are able to see in these associations the great value of organized and concentrated action, the lack of which is one of the greatest problems of country life.

GRAPE CULTURE

J. M. Greer, '17

Statistics show that the number of acres planted in grapes in the South has been decreasing for several years. In 1890 there were 21,538 acres of land planted in vineyards, in 1900 there were only 16,886 acres, and in 1910 there was a still smaller number. In Tennessee the number of bearing vines in 1899 was 355,000 while in 1910 there were only 338,758. The vines of bearing age in 1899 were 12,000, and in 1910 only 8,000. Thus we see that the grape production in Tennessee has fallen off, and there may be just cause for alarm should this decrease be continued. We may say, however, that our present prohibition laws have been an important factor in the decrease of the vintage acreage. But grape juice has taken the place of wine and grapes may still be grown profitably for its production. Also the commercial vineyards in the South ought to be able to supply the large demand for this fruit on southern markets two or three weeks prior to the time when northern grapes are shipped into this section. Again, many homes in the city and small village may supply their own tables from a small vineyard in the garden or back yard. Some skill and labor is required in order to grow grapes successfully and the following suggestions may be of value in the undertaking of this work.

Location

The sun's rays are invaluable in checking many fungus diseases which attack the grape vines, and so a hill-side with a southern exposure is always preferable for the location of a vineyard. The vines will thrive upon any soil in the South that is well drained; but for commercial production it is best to plant upon a light sandy loam.

Planting

Cuttings should be taken from the canes of the previous year's growth. These cuttings should be taken from vigorous vines and should be marked by three fruit buds spaced very close together. The lower end of the canes should

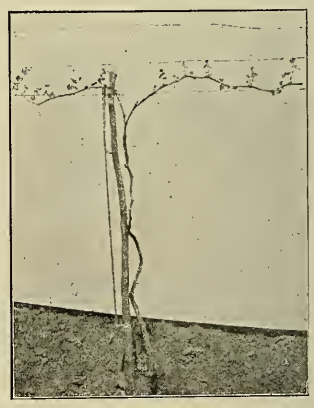
have a transverse cutting one inch below the end bud, while the opposite end may be marked by a diagonal cutting across the upper end bud. During the spring these cuttings take root, and the following spring the plants are ready to set in the permanent vineyard. As a general rule the rows should be spaced twelve feet apart and the plants should be placed from ten to twelve feet apart in the rows. Before setting out the plants the soil should be put in good condition by fallowing or by the turning under of a green cover crop.

Culture

The cultivation of the vineyard should be shallow and the cutaway harrow is a good instrument to be used for this purpose. This cultivation should continue through the summer months until fall. About the middle of August rye and crimson clover may be sown for a green cover crop, which should be turned under the following spring. As a general principle, according to New York and California bulletins, it is a waste to make applications of fertilizer on poorly drained vineyards, and the grower may assume that his vines do not need fertilizer if they make a fair annual growth. In all experiments undertaken so far no definite conclusions can be given in favor of the use of fertilizer.

Pruning

The pruning of the grape vine is done while the plant is dormant. This occurs during the period between the falling of the leaves at the beginning of winter and the start of the bud growth in the early spring. It is safe to say that full returns from vineyards can be obtained only when there is a comparative uniformity of vigor within the individual vines. Since the fruit is borne upon shoots or canes which grow from the wood of the previous year's growth, the one object is to secure a well formed vine carrying sufficient young wood to bear such crops of fruit as the vine seems capable of supporting. The first fall after planting the pruning consists in cutting back nearly to the ground, leaving only a spur of three or four buds. The second season the number of canes that may grow should be adapted to the system of pruning which we wish to follow permanently. The following systems have been found profitable.

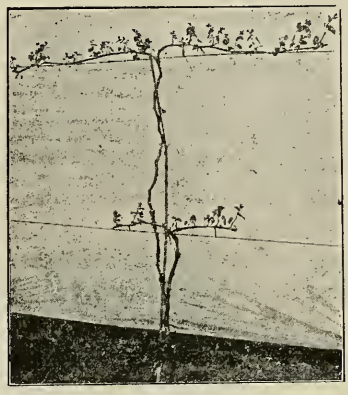


1. **The Munson Canopy System.** This is one of the best systems for the South. Two wires are strung on cross arms two feet long and a third wire fastened to the post between these two wires and six inches lower. The growth of the first season is confined to a single shoot which is tied to a stake

and allowed to grow until it has nearly reached the middle wire. Then the tip is removed and the two upper buds develop branches which are trained in opposite directions along the wire to form the future arms. The first winter these are cut back to nearly half the distance to the next vine. The second winter leave about four spurs of three joints each on either arm. These twenty-four buds will produce about forty-eight bunches of grapes. Each winter remove the spurs which have borne fruit and replace by new spurs from the main arms.

2. **The Diagonal Cordon.** Two main arms are trained diagonally up a three-wire trellis and the fruit grown upon spurs which are allowed to grow out from these arms to a length of two to four joints. During the winter the old spurs are cut off and new ones left for the fruit of the next summer.

3. **The Kniffin System.** One shoot is allowed to grow up to each of two wires then the end is pinched off and the two upper buds develop branches which are trained along the wires in either direction, forming four arms on which fruit is borne. The old arms



are removed in the winter and new canes left for the next crop of fruit.

In whatever system we may employ, the fruiting wood should be kept as near as possible to the growing branch. No cane, arm, or division should be allowed to grow more than one season unless destined to become a part of the skeleton of the mature plant.

Spraying

In Tennessee the most injury to grapes is caused by the black rot. This is a fungus disease, and it should be controlled by spraying in the spring at the time when the first leaves have unfolded and before there are any blooms. The spraying is done with Bordeaux Mixture. This spraying is to kill any spores that may have wintered over upon the vines, posts, wires, etc. The spraying is repeated with Normal Bordeaux after the blooming period, when the fruit is well set. As a general rule, the spraying is continued at intervals of two weeks, depending upon weather

conditions. The Bordeaux Mixture used is made according to the following formula.

Bluestone _____4 lbs.
Lime _____4 lbs.
Water _____50 gallons

If, at any time, insects should become injurious to the grapes, two pounds of arsenate of lead are added to the Bordeaux solution in order to kill the insects also at one spraying.

Sacking Grapes

The Kansas Experiment Station found that it cost only one cent per pound to bag grapes, and that by doing this they doubled their profits. In New Jersey grapes are bagged at a cost of one-half cent per pound and it pays in every case. Work at the fruit farm of the Tennessee Experiment Station has shown it pays to sack grapes. The Manilla paper bags, of one pound size, are preferable, because the grapes can be gathered to better advantage by tearing off the sacks. Some growers, however, use cloth bags made especially for this purpose, while in France wire gauze bags are used. When the paper bags are used they are torn down about two inches on each side, and a small hole is made with the blade of a knife in one of the lower corners of the bag. It is then pulled over the bunch above the branch and the sides are securely fastened with a pin. In gathering grapes the bunches should not be broken off, but they should be cut off with scissors.

Varieties

The European varieties have proven a failure in this section, so only those varieties that are native to this country are cultivated. For commercial vineyards the Concord, Moore's Early, and Niagara are the best varieties. The Brighton, Lindley, Delaware, and Brilliant may be added to the above varieties for the average farmer or small gardener.

SHEEP IN TENNESSEE

Dick Boyd, '18

There is probably no state in the Union that is better adapted to sheep growing than is Tennessee. About one-half of the land of this State is unproductive and to obtain the greatest returns from this vast area of rough land it seems that there is no animal that would surpass the sheep. We have a mild climate and plenty of rolling land which would furnish an abundance of grass for pasture during the summer months. There is no part of Tennessee where a few sheep could not be kept to an advantage.

During the winter months they could be pastured on the wheat, rye and barley crops, which amounted to 644,226 acres in 1910, and according to the better methods of agriculture this number is far too small. We have an area of 10,096,106 acres of tillable

land, and out of this acreage not less than 2,000,000 acres should be sown annually to these crops.

Since one acre of wheat or barley will support two ewes and their lambs, that amount would enable us to pasture at least two and one half millions of sheep, and we have now only 795,033 sheep in this State. We need four times this number.

It is not yet advisable to go into the sheep business exclusively, but it would be profitable for each farm to keep enough sheep to consume the rough feeds, and at the same time graze down the winter crops and destroy many weeds. As both wool and mutton are bringing high prices now and are likely to do so in the future we should wage a campaign which will induce our farmers to engage more generally in this industry. One of the main factors which discourage our Tennessee farmers from keeping sheep has been the dog. And it has now become very necessary that stringent laws be passed and enforced which will protect the sheep from roving dogs.

It is only within the past twenty years that the production of spring lambs has been developed. This is now considered to be the most important factor in the sheep industry. The first car load of lambs that arrived on the Chicago market this year brought $17.85 per hundred pounds. But these high prices in many cases lead the farmer to sell off too closely and by so doing he fails to maintain his flock. He should plan to improve it each year by selling off all ewes that have not proven satisfactory on account of age, failure to breed, or to raise a lamb, and to replace them with ewe lambs of good type from the best mothers. In this way the productivity of the flock can be greatly increased. The main factors to be considered in the production of spring lambs is to have them dropped as early as possible in order to reach the first market. If they are ready to ship by the 10th of April the top price

A SCENE WHICH SHOULD BE MORE COMMON IN TENNESSEE

will be received for them. In order to do this the ewes will have to be placed on a fresh rich pasture to "flesh" them. This should be done about the last week of July, placing the ram with them the first of August.

While the number of sheep in Tennessee is showing a slow increase, the number in the United States is showing a decided decrease and is greatly affecting the supply of wool and meat, and for this reason alone we should put forth every effort to grow more sheep in Tennessee.

CARE OF THE MARE AND FOAL

A. J. Dement, '19

The care of the mare and foal really begins at the time of impregnation. The mare should have no sudden change of diet, no very hard work, no scares or frights and no over-feeding or over-heating. She should be protected from all bad weather, because it is likely to cause distempers, influenza or some other serious disease. Many foals are lost on account of pure ignorance or neglect on the part of the mare's keeper.

The mare in foal should be kept in a clean, well ventilated box stall or in a shed adjoining a pasture. Many farmers work their brood mares up till about two weeks before foaling time, which is not a bad plan if the work is light. When the mare is not worked she should be given an abundance of exercise daily. The best ration for a brood mare is shelled oats and wheat bran with plenty of timothy hay and grass. Fresh water and salt should also be kept in reach.

About two weeks before foaling time preparations should be made for foaling. One plan is to clean all the waste from a well built, 12x16 box stall, then disinfect the entire stall and bed it with wood shavings or straw. The other way is to use a well-fenced small open grass lot where no hogs or other stock can get in. The former method is good for all kinds of weather and is the safest and most commonly used.

The mare is kept in this stable except when exercising. It is best to cut off the grain feeding now as much as possible and feed more green stuff. As soon as the foal is dropped a pail of luke warm water and a wet bran mash may be given to the mare, for she seems to have a great appetite at this time and it will help steady her nerves.

The foal should be closely watched and aided in standing up. If the weather is cold a blanket may keep him from chilling. He should be able to stand alone and nurse by the time he is three hours old, if not, then his attendant should aid him by using his finger to guide the foal's mouth to the teat. Before the foal is twenty-four hours old an excretion should pass from the intestine, if it does not and the foal appears sleepy and throws up his head and switches his tail it will be necessary to inject a pint of warm soapy water

into the intestine. Then if not relieved an ounce of castor oil given in a half pint of milk will usually bring the desired result.

The mare should be kept in the stable for about two days. Then if the weather is warm she and the foal may be turned into a good grass lot where no other stock are near. At night they should be brought back to shelter and at all times the foal should be kept out of the rain. The stall must be constantly cleaned, disinfected and bedded in order to keep away all diseases that are likely to attack the colt.

The feed for the mare should be shelled oats and wheat bran with hay and plenty of grass or green wheat if grass is not available. Fresh water must be kept where both mare and foal may obtain it when they wish.

When the foal is two weeks old the mare may be put back to light work again. It is safer to leave the foal in the stable while the mare is at work but be sure that there are no nails, splinters or holes in the walls that might injure the foal in his fits of anger. For the first time or two the mare should only be worked half the day. Then even as the foal grows older he should be allowed to nurse three times a day. The mare must not be turned to the foal while she is hot, because the hot milk is likely to injure the colt. It sometimes causes colic or other forms of indigestion.

If the mare is not worked, in many cases she is turned out on the grass without dry feed while the colt is yet young. This will injure the mare and stunt the foal. The mare should always be fed, even if she is on good pasture, untill the foal is old enough to depend largely upon his own resources. A curry comb and brush never has failed to help the looks and feeling of a mare and foal and should be used freely once a day.

The foal should be handled as often and as gently as possible. He goes to eating at about six weeks of age and one of the best ways to make friends with him is to feed him sugar from your hand. He will soon become your first greeter on entering the stable or the pasture, he will follow and pick at you. Then the halter may be applied and he will readily lead beside his mother. Next the attendant may teach him to lead alone by placing his right arm over the foal's back and walking at his side. A bit of urging may be necessary, but the foal will soon catch the meaning and respond immediately.

The foal is old enough to wean at six months. There are two ways of weaning, one by suddenly taking the foal from the mare and not allowing them to see each other again. The other way is by gradually weaning the foal off, first by placing a pole between him and his mother in the same stable, then by placing them in adjoining stables where they can see each other, then finally apart. The former method is quicker and more generally practiced.

As soon as the foal is taken from his mother he should be placed (several colts in the same stable will wean with less worry than one

alone) in a clean, well ventilated, smoothly built box stall. He should be fed abundantly on shelled oats, wheat bran, hay and green corn or grass. Fresh water should always be at hand. After about two weeks the colt may be turned into the pasture, but dry feeding must not stop because the foal must be kept in good shape to pass the winter well.

The mare must be fed dry rations until her milk flow ceases. It is necessary to milk about half the milk from the udder once a day in order to stop the flow and save the udder. After about a week the mare may be turned out to grass and considered as the mother of a good, healthy, valuable foal.

HOME ECONOMICS EXTENSION WORK

Miss Ruby McSpadden, '17

Extension work in agriculture has been carried on for some time and is fairly well advanced; but extension work in home economics is yet in its very infancy when we think of the vast number of things is includes. Not only cooking and sewing come under this field of work, but home sanitation and sanitation of schools, churches and all public buildings; management of the household; marketing; household art and so on.

The girls' canning clubs are included in home economics extension work and cannot be commended too highly for what they have done and are doing. These are confined to local districts and in addition to them is the six weeks short course in this work given in some of the rural high schools and rapidly spreading to others.

Then there is the Home Economics Extension Department here at the State University, which is carried on under the guidance of Miss Conway.

And larger than this is the American Home Economics Association which met this year at Detroit, Michigan, in connection with the Department of Superintendence of the National Education Association.

Also here we have the convention of the canning club and county agents, which was largely attended this past year. The number in attendance and their regularity shows the deep interest that is being taken in this extension work.

The same line of work is being carried on in other states. During January, The College of Industrial Arts at Denton, Texas, gave a short course in home economics extension work to over thirty county canning club and home demonstration agents of the State. Their idea was to give a course which would benefit directly the agents themselves and indirectly meet the conditions and needs of the farm home.

The Florida State College for Women gave a short course from February 22 to March 5. This course was not for county agents or demonstrators but for the

housekeepers themselves. They took up the study of sewing, cooking, nutrition, home care of the sick, and art and literature in the home. Besides this course they have an annual school for home demonstration agents.

The State Agricultural Colleges of Utah and Oregon have what they call housekeepers' conferences.

Mississippi Agriculture and Mechanical College also has a course known as the school for home economic extension agents.

There is a home economics association in Washington, D. C., one in New England and one in Philadelphia. The University of Maine has an extension department, Missouri has an association of household arts and sciences, in fact nearly every state in the union has some sort of household extension association.

There is also an international congress for the teaching of home economics with its permanent office at Freiburg, Switzerland. The office at Freiburg aims at being a clearing house for material on home economics subjects and publishes quarterly a bulletin which is the only publication regularly summarizing home economics news from many countries. A third congress of this association was to have been held in Leipzig in 1915 but the European War prevented it.

On November 16 and 17 last year the first sectional conference of home economics teachers in normal schools met at Peabody College for Teachers in Nashville, in response to an invitation sent out by Dr. P. P. Claxton. They discussed the proper length of home economic courses in normals and the increasing demand for short courses in that subject.

Also last November the meeting held at the East Tennessee State normal in Johnson City was the first home economics conference ever held in East Tennessee. Parts of the program varied somewhat from the usual topics; for such subjects as the importance of women's club work in home economics, the necessity for mothers clubs and so on were discussed.

These brief statements and reports concerning the different home economics associations and meetings show plainly the increasing interest that is being shown in this work and that it is working side by side and hand in hand with the agricultural extension departments.

THE TIME TO APPLY FERTILIZER

L. C. Pace, '16

The question of the time to apply fertilizer is often thought of and sometimes is asked and in order to answer this question several experiments have been carried on along this line, mostly with cotton and corn; but from this we can draw some very profitable conclusions.

The North Carolina Station has done a great deal of work on the application of fertilizer at different times for cotton and corn. They

report that on clay soils, cotton yielded less when the application was divided, one half applied at planting time and one half on July 1, but on fine sandy soil the reverse was noted. At the experiment station (clay soil and sandy clay soil), with cotton the best results were secured by using dried blood or cotton-seed meal and applying it all at planting time in the row with the carriers of phosphoric acid and potash. At the Edgecombe farm (fine sandy loam) the highest yield of seed cotton on an average was secured where half of the nitrogen was supplied in the form of dried blood in the row at planting time with phosphoric acid and potash, and the remaining half of the nitrogen application reserved and made as a side dressing in the form of nitrate of soda about July 1. On the Piedmont Cecil (sandy loam soil) slightly the largest profit per acre was secured by applying all the nitrogen with the phosphoric acid and potash before planting, having four-fifths of it derived from dried blood and one-fifth from nitrate of soda. The most profitable method, every thing considered, of applying the fertilizer mixture as the results would seem to indicate, would be in the drill at planting time at the ordinary depth.

The Alabama Station reports that the average of the conclusive experiments with cotton in both 1912 and 1913 showed that 200 lbs. of cotton-seed meal applied before planting was practically equal in effect to 100 lbs. of nitrate of soda applied after the plants were 6 inches high.

The Georgia Station reports that with cotton when the fertilizer was applied and bedded on before planting, 56.27 lbs. more seed cotton per acre was produced than when two-fifths was drilled in the opening furrows and bedded on, two-fifths applied June 9 and the remaining one-fifth June 30. This was in general accord with results during the preceding season.

The experiments with cotton at the Mississippi Station (sandy loam soil), showed that in a test of different nitrogen sources and of applications made entirely at planting time, or half at planting and half on July 20, 2483 lbs. of seed cotton per acre was obtained after fertilization with 80 lbs. of nitrate of soda on each of these two dates as compared with 2133 lbs. when 160 lbs. were applied at planting time. An application of 200 lbs. of cotton-seed meal at planting time and 80 lbs. of nitrate of soda July 20, was followed by a yield of 2216 lbs. of seed cotton per acre. This application ranked second in value of increased yields over the cost of the fertilizer used, the divided application of nitrate of soda being first in this respect as well as in yield.

Judging from the preceding experiment station results it does not seem advisable to divide the fertilizer application for the cotton crop on clay soil and sandy clay soils and, although it causes a slight increase in yields to divide the nitrogen material on a sandy or sandy loam soil, especially if nitrate of soda is used, the margin of profit is so close that a consider-

able risk is run even in the latter case.

The Tennessee Station, with cotton on the West Tennessee soils recommends the application of fertilizer in the rows a few days before planting; if nitrate of soda is used it should not be mixed with the other material but applied separately as a top dressing along the rows when the plants are small, say one foot high, or less.

In the application of fertilizer to corn the Georgia Station reports that: "Better results are shown to have been obtained by applying a complete fertilizer at the time of the second cultivation than before planting. Application of complete fertilizer from 200 lbs. to 600 lbs. per acre in 100 lbs. degree gave gradual increased yields but not sufficient to cover cost when not more than 200 lbs. was applied."

At the North Carolina Station the experiments show that dividing the entire fertilizer application seemed to have no effect on the corn crop. "With corn at the Edgecombe Farm (sandy loam), dividing the blood application and applying half with the other materials in the rows at the planting of the corn and adding the other half as a side dressing about July 1, produced better results than applying all the blood at planting or half of the nitrogen as blood at planting and the other half as nitrate of soda as a side dressing, or all nitrogen in the form of nitrate, half at planting with phosphoric acid and potash and the other half as a side application about the first of July. At the experiment station farm (clay soil and sandy clay soil) with corn, better results were secured where half of the nitrogen as blood was applied with the potassic and phosphatic material at planting and the other half of the nitrogen as

Unfertilized Fertilized

ALFALFA FROM TWO PLOTS OF EQUAL SIZE

nitrate of soda applied about the first of July, than when all the nitrogen was supplied by nitrate of soda, half being applied at planting with other materials and half later as a side dressing."

At the Isedell Farm (clay soil), dividing the blood application, or substituting nitrate in part or in whole for the blood and dividing the application of the nitrate of soda, did not produce as large yields as was secured where all the nitrogen as blood was applied with the phosphoric acid and potash at planting, or where the whole application, blood being the carrier of nitrogen, was divided, half being put on as a side dressing about the first of July.

The advisability of applying the entire fertilizer application at planting time on close texture soil is noted, while it may be divided, especially the nitrogen on open soils, and the first application made in an organic form and the second in a mineral form.

In the experiments of applying nitrate of soda to corn at the Tennessee Experiment Station the results point definitely to the application of the nitrate at an early stage of growth, the gain being greatest when the plants were from 3 inches to 2 feet high. The application at tasseling time did not show any increase in yield of grain, the only apparent effect being a deeper green foilage.

Under less favorable conditions the increased yield proved insufficient to pay for the nitrate, and in very unfavorable seasons no increase in grain production was obtained. Evidently there is considerable risk run. All things considered the margin of profit appears at the present time to be too small to permit the recommendation of nitrate of soda for the corn crop, except possibly a very light application under special conditions of nitrogen deficiency.

From the experiments taken from three different stations one will notice the advisability of applying all the fertilizer at planting time with the exception, possibly on sandy soil, of the nitrogen and part of that should be applied in the organic form at the time of planting and the other applied in the form of nitrate of soda when the corn is less than two feet high.

In the experiments on Irish potatoes, the results show that as good yields were obtained where all the fertilizer was applied in the rows before planting as when nitrate of soda was applied, one-half as a top dressing when the plants were just coming up and the other half in ten days or two weeks.

If nitrate of soda is to be used on wheat or other winter crops it should be put on in the spring as soon as growth starts, but no kind of nitrogenous fertilizers should be put on at the time of seeding as they are detrimental to the germination of the seed with which they come in contact. Acid phosphate does not injure the germination so that when used alone no precaution is necessary and it can be put in at the time of seeding.

TIMELY TOPICS

U. S. Department of Agriculture

(This column contains the gist of several reports received from the Office of Information, U. S. Department of Agriculture)—Ed.

About a million tons of cottonseed meal was used as fertilizer in 1913. It contains about 6.5 per cent of nitrogen, 2 per cent of phosphoric acid, and 2 per cent of potash. It should be mixed in equal weight with acid phosphate, giving a material containing about 9 per cent phosphoric acid, 3.25 per cent nitrogen, and 1 per cent potash. Most of the mineral ingredients in cottonseed meal are recovered in the manure if the material is used as a cattle feed. The most economical use of cottonseed meal is, therefore, to feed it and apply the manure to the land. In this way the material is made to serve a double purpose. Wherever possible the practice of feeding the meal and using the manure for fertilizer should be followed rather than the direct application of the cotton-seed meal to the land.

The value of farm lands of the United States, without improvements, is estimated at $45.55 per acre as compared with $40.85 a year ago, $40.31 two years ago, $38.10 three years ago, and $36.23 four years ago. The census reported the value of farm lands in 1910 as $32.40 and in 1900 as $15.57 per acre. The greatest increase in any one section for the past year was in the South Atlantic States, which showed an increase of 19 per cent.

April 20th was set aside by the Governor of Louisiana as Tick Eradication Day, every school teacher being directed to devote one hour on that day to explaining the subject of tick eradication to the pupils. A tick eradication campaign is already in full swing throughout that State.

Effective rural cooperation, improvement of living conditions and practical agricultural education supply the text for many of the popular illustrated articles published in the 1915 year-book of the U. S. Department of Agriculture. This volume, which consists of some 600 pages, has just been received from the printer and shortly will be distributed to Congressmen to crop correspondents and to others entitled to receive it. Among the articles on cooperation are: "The Cooperative Purchase of Farm Supplies"; "A Successful Rural Cooperative Laundry"; "How the Department of Agriculture Promotes Organization in Rural Life"; and "How the Whole County Demonstrated."

To Inoculate Seed

Coating the seeds of legumes with inoculated soil before planting is a simple method of insuring soil inoculation at slight cost. County agents in Illinois have found ordinary furniture glue effective in holding particles of inoculated soil to the seeds. This method gives each individual seed some of the particles of inoculated

soil which it carries with it when it is planted. The scheme requires but a small amount of inoculated soil and costs but a few cents an acre. The method is described in Farmers' Bulletin 704 of the U. S. Department of Agriculture as follows:

Dissolve two handsful of furniture glue for every gallon of boiling water and allow the solution to cool. Put the seed in a washtub and then sprinkle enough of the solution on the seed to moisten but not to wet it (I quart per bushel is sufficient) and stir the mixture thoroughly until all the seed are moistened.

Secure the inoculated soil from a place where the same kind of plants as the seed are growing, making sure that the roots have a vigorous development of nodules. Dry the soil in the shade, preferably in the barn or basement and pulverize it thoroughly into a dust. Scatter this dust over the moistened seed, using from one-half to 1 gallon of dirt for each bushel of seed, mixing thoroughly until the seed no longer stick together. The seed are then ready to sow.

NEWS

The 43rd Annual Meeting of the East Tennessee Farmers' Convention will be held at Temple Hall May 16, 17 and 18. Devotional exercises will be conducted by Bishops Gailor and Atkins. There have been appointed 2,500 delegates.

This convention is expected to be one of the best ever attended by the farmers of the State. An excellent program has been arranged and several specialists have been secured to address the meeting. The Home Makers' section is fortunate in securing Miss Jessie Field of the National Y. W. C. A. of New York. The girls' canning clubs and the boys' corn clubs will be separate features of the convention. Thirty-two county collaborators will give demonstrations of club work. Misses Ambrose and Conway are on the program for the East Tennessee Division, Miss Virginia Moore for the Middle Tennessee Division and Miss Kinsey for the West Tennessee Division.

Some of the men outside this State who are on the program and their subjects are:

Hon. Bradford Knapp, Chief of Office of Farm Demonstration Work of the South—"Community Organization."

J. Sprunt Hill, Raleigh, N. C.—"Rural Credits."

Crandon Davis, Huntsville, Ala.—"Capital and Income From the Farmer."

Carl Vrooman, Assistant Secretary of Agriculture, Washington, D. C.

Other Speakers are:

L. W. Rhodes, President of Farmers' Union of Tenn.—"Cooperation."

Prof. Hayworth of East Tenn. Normal, Johnson City—"What Is the Matter With the Farmer?"

C. J. Haase, Memphis—"The Business Man's Interest in Agriculture."

Judge Hughes of Court of Appeals —"Useful Birds of East Tenn."
Mr. Maddox, State Forester, Nashville—"The Farmers' Wood Lot."
Prof. C. A. Mooers, Tenn. Experiment Station—"Summer and Fall Sowing of Crops."
Dr. M. Jacob, Tenn. Experiment Station—"Hog Cholera Control."
Prof. C. A. Willson, Tenn. Experiment Station—"Can the 100-200 Acre Farmer Afford to Raise Beef Cattle?"
Brief addresses will be made by:
H. K. Bryson, Commissioner of Agriculture of Tennessee, and
The Presidents of the Middle and West Tenn. Farmers' Institutes.

Prof H. A. Morgan attended the Southern Conference for Education and Industry which was in session at New Orleans Apr. 16-20, 1916. Prof. Morgan gave two addresses, one April 18 on "A State System of Extension Work" and the other April 20 on "How can we best extend the work of the Agricultural Colleges to the farmer?"

Mr. C. A. Hutton, of the Extension Division, was in Madison County the week of April 17 organizing cooperative creameries. Mr. Judd Brooks, County Agent of Madison County and Creamery Specialist Gilbert assisted in the work. Mr. Hutton made visits and a number of demonstrations in Fayette and Shelby Counties. The West Tenn. Normal was also visited. Mr. Hutton's tour, which lasted about ten days included a trip North for the purpose of purchasing cattle for the creamery at Martin, Tenn.

Five agricultural students of the University have received appointments as county demonstrators. They are of the class of '16 and are already in the field. Mr. E. F. Arnold has been given special work in demonstration and rural organization in three counties, Johnson, Carter and Unicoi. Mr. S. G. Abernathy has been appointed county agent of Gibson County; Mr. Benton Elrod, county agent of Haywood; Mr. I. T. Elrod, county agent of Overton; and Mr. Evan McLean, county agent of Williamson County.

Mr. H. E. Baker, '15, has charge of the Lincolnton Creamery of Lincolnton, N. C.

The latest addition to the livestock of the Experiment Station at Knoxville is the bull Huanna DeKol 160742, sired by Johanna Korndyke DeKol I 86043, whose dam's record was 29 lbs. butter in 7 days. Huanna DeKol was bred by the Experiment Station at Jackson. His dam, Violet Houwtje Lady 121618, has a record of 18000 lbs. milk in one year. Two half Herefords half Angus beef calves have also been purchased by the Station for class work from Dr. J. I. Huggins.

During the year 1915 the U. T. Cooperative Creamery paid its patrons $14,665.54. The minimum paid for any one month was $54.93 in January and the Maximum was $2,145.69 in July. The total output of butter for the year was 60,858 pounds. The present price received for the butter is 35 cents per pound.

The students and Professors of the Agricultural College have had the opportunity of contributing to the Joseph E. Wing Memorial Fund. This fund, which is gotten up by the agricultural colleges of the country in honor of the late Joseph E. Wing, is for the purpose of bringing to the State Agricultural Colleges, during farmers' week or other times, men of national reputation to lecture on agricultural subjects. The sum of $41.00 was turned over to the Chairman of the Memorial Fund Committee, Mr. H. C. Price of Newark, O.

Prof. C. A. Willson was in Jackson for the purpose of addressing several farmers' unions during the week of April 20th.

Miss Thomas of Columbia University, New York, paid a visit to the Extension Department Thursday, April 20th.

Messrs. H. D. Tate and D. T. Hardin of the Extension Division have been on a visit in the northeastern part of the State. Mr. Hardin was in Hawkins County reviewing the work of County Agent J. L. Henshaw. Mr. Tate was in Elizabethton and Wautauga and assisted Mr. Arnold in field work.

Prof. S. M. Bain's Histology class made a trip to the Smokies on April 14 and remained at Elkmont for five days. Much new material was obtained for the class and all report a pleasant trip. Those in the party were: Prof. and Mrs. Bain, H. F. Bain, C. M. Haensler, Misses Ellen Converse, Margaret Conover, Aubrey Faulkner and Mary Evans.

Work on Cherokee Farm is progressing rapidly. In March the land was plowed the second time for the purpose of getting rid of the wild onions. The first plowing was in November. Seven acres of soy beans have been planted for hog pasture and experiments are being made with Kudzu. The Farm is the recipient of three new wagons from Mr. G. R. James of Memphis.

Mr. T. T. Hackworth, '17, spent the Easter Holidays at his home in Anderson, Tenn., where he was employed by his father in vaccinating some hogs on their farm.

The University is offering for the coming year a Country Life Course for Women. It combines cultural and practical subjects in balance for women who intend to go back on the farm. Subjects that will fit her to take part in community upbuilding are given full consideration. The course leads to the degree of Bachelor of Science.

The U. T. FARMER

Scientific; therefore practical

Published Monthly by the Agricultural Club of the University of Tennessee

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EDITORIAL

With this issue "The U. T. Farmer" changes hands. The old staff goes out and new men take their places. It is for us to do the work as thoroughly and as efficiently as did they and we realize that the task is not an easy one, for they were capable and conscientious men who did their work well. During the past year the publication has improved and prospered under the wise management of the retiring editor, whose energy and enthusiasm largely account for this success. We who now take the work in hand have that much more to begin with and we should, therefore, make a correspondingly greater growth and improvement.

The "Farmer" has required ten years to attain its present size and scope. From a small beginning ten volumes have been produced, each one better than the one before, as each new administration profits by the experience of those who have preceded it. Adhering to our motto "Scientific; therefore practical," the first staff laid a firm foundation and since then each one has taken what was found and builded on a little more and a little better, making here an addition and there an improvement as time and experience showed what was best and as new opportunities opened for broader fields of work. It is our duty as well as our desire and aim to take what has been turned over to us and to make of it something bigger and better and more useful. This cannot be accomplished by any one man alone nor by any small group of men, but only by the hearty cooperation and support of the agricultural student body as a whole. "The U. T. Farmer" does not belong to the staff alone, nor to any member of

the staff, but to the students themselves. It is our magazine and by working together we can make of it what we will.

We wish to call the attention of our readers to the forty-third annual East Tennessee Farmers' Convention, which meets here May 16-18. This is a busy season for the farmer but some time may well be taken to come to Knoxville and hear the experience and advice of others. Life is too short for a man to attempt to solve all his problems alone and learn everything by experience. Others have solved many of the same problems and learned the same lessons and in many cases have done it so well that they are now being paid to tell you and others how they did it. Avail yourself of the opportunity to hear these men and women who are experts in their respective lines, and they may save you much useless worry and fruitless toil. Besides the opportunity to hear learned discussions by agricultural experts and demonstrators, much is gained by an exchange of ideas between farmers themselves. No farmer can converse long with others who have similar interests and experiences without going away with some idea which will be helpful to him. It is said that much of the success of the progressive farmers of the western states is due to the great variety of ideas exchanged. When a few of them get together and discuss any plan or piece of work, one man tells how they do it in Virginia, another how he used to do it down in Georgia, and a third will tell how he was taught to do it in Tennessee. Then they may decide upon the best points in each method and so agree on the best plan to adopt. In a like manner farmers from different counties may be able to offer to each other suggestions which will be mutually helpful. This year the Woman's Department will be a prominent feature of the convention and as many farmers' wives as possible should be on hand for the many good things offered by Miss Virginia Moore and other women in that department. And, of course, there is due provision made for the boy and the girl. The Corn Club and the Tomato Club headquarters will be busy places crowded with interest and enthusiasm. The farmers themselves usually attend the Convention pretty well but this year we want to see about a thousand of them bring their families along. Then we shall have a sure enough Convention which will mean something to the farm, to the home and to the family.

A campaign against flies and mosquitoes in the early summer will mean comparative freedom from these pests in July and August. A swat in time kills a million. The first move against the fly is to screen all doors and windows. Unless this is done, flies will be a nuisance and a menace to health, no matter how much fly paper and poison is used or how clean the premises are kept. All breeding places for flies, such as manure piles, etc., should be carefully looked after. When you have destroyed the hatcheries on

your own farm, be sure not to leave anything exposed that will attract your neighbor's flies.

The common mosquito, while not so numerous or deadly as the fly, is more bloodthirsty. Ordinary fly screening will not keep him out. Mosquitoes breed in ponds, rain barrels, old cans, or anywhere standing water is found. Whenever possible the water should be poured out or drained but if it is impracticable to do this, cover with a thin coating of kerosene oil. One gallon will cover from 1500 to 2000 sq. ft. The mosquito larvae or wiggle tails come to the surface to get air. They cannot break through the covering of oil and die from suffocation.

F. W. C.

EAST TENNESSEE FARMERS' CONVENTION

That the forty-third annual meeting of the East Tennessee Farmers' Convention, which is to be held in Temple Hall May 16, 17 and 18 will be the greatest ever held is the opinion of the officers of the convention.

The program will be held under the auspices of the state department of agriculture, Hon. H. K. Bryson, commissioner, and the Division of Extension of the College of Agriculture of the University of Tennessee, Charles A. Keffer, director.

The complete program is as follows:

GENERAL PROGRAM

MONDAY, MAY 15

2:00 p. m.—Meeting of County Vice-Presidents.

TUESDAY, MAY 16

10:00 a. m.—Call to order.

Invocation.

Appointment of committees.

President's Address, H. M. Wilson, Niota, Tenn.

10:30 a. m.—Greetings from the West Tenn. Farmers' Institute, Dr. R. M. McRae, President, Union City, Tenn.

10:45 a. m.—Greetings from the Middle Tennessee Farmers' Institute, J. N. Meroney, President, Darts' Mill, Tenn.

10:45 a. m.—Address. Hon. H. K. Bryson, Commissioner of Agriculture, Nashville, Tenn.

11:30 a. m.—Historical Notes of the Convention. J. K. P. Wallace, Andersonville, Tenn.

12:00 m.—Dinner.

1:00 p. m.—Devotional Exercises, with Congregational Singing. Rev. James Atkins, D. D. Bishop M. E. Church, South.

1:30 p. m.—Hog Cholera Control. Dr. M. Jacob, State Veterinarian, Nashville, Tenn.

2:15 p. m.—Summer and Fall Sown Crops. Prof. C. A. Mooers, Agronomist, Tenn. Experiment Station, Knoxville, Tenn.

3:15 p. m.—Capital and Income on the Farm. Hon. Clarendon Davis, Huntsville, Ala.

4:00 p. m.—Inspection of Cherokee Farm, where demonstrations of plowing, subsoiling, etc. will be given.

7:30 p. m.—The Useful Birds of East Tennessee. Judge H. Y. Hughes, Knoxville, Tenn.

8:00 p. m.—Experience Meeting. General discussion by delegates:

1. Alfalfa Growing.
2. Sudan Grass.
3. Effect of Soy Beans Upon the Succeeding Grain Crop.
4. Breaking with the Subsoil Plow Alone.
5. Forage Crops for Hogs.
6. Cover Crops Seeded at Last Cultivation of Corn.
7. Saving Crimson Clover Seed.
8. Cooperative Buying of Seeds, Fertilizers, and Other Farm Supplies.

WEDNESDAY, MAY 17

(Section Meetings 8:30 a. m. to 10:45 a. m.)

11:00 a. m.—Address. Hon. Carl Vrooman, Assistant Secretary of Agriculture, Washington, D. C.

12:00 m.—Dinner.

1:00 p. m.—Devotionals. Bishop Atkins.

1:30 p. m.—Rural Development:

1:30 p. m.—(a) Community Organization. Hon. Bradford Knapp, Washington, D. C.

2:15 p. m.—(b) The Rural School. Prof. S. W. Sherrill, State Superintendent of Public Instruction, Nashville, Tenn.

3:00 p. m.—(c) Cooperation Among Farmers. Pres. L. M. Rhodes, Tennessee Farmers' Union, Huntingdon, Tenn.

3:45 p. m.—(d) Rural Credit. Hon. J. Sprunt Hill, Raleigh, N. C.

5:00 p. m.—Inspection of University Farm and Live Stock.

7:00 p. m.—The Farm Wood Lot. R. S. Maddox, State Forester, Nashville, Tenn.

7:30 p. m.—Experience Meeting. Topics:

1. Alfalfa Hay as a Horse Feed.
2. The Heavy Horse for Tennessee.
3. Does a Silo Pay?
   The Wooden Hoop Silo.
4. Do Cattle Graze Well After Wintering On Silage.
5. Live Stock Organizations.
6. Sheep in East Tennessee.
7. The Dual Purpose Cow.
8. Farm Labor.

THURSDAY, MAY 19

9:00 a. m.—Devotional Exercises. Rt. Rev. Thos. Gailor, Protestant Episcopal Bishop of Tennessee, Memphis.

9:30 a. m.—What is the Matter With the Farmer? Dean D. R. Haworth, East Tennessee State Normal School, Johnson City, Tenn.

10:30 a. m.—The Business Man's Interest in Agriculture. C. J. Haase, Chairman, Farm Development Bureau, Memphis Business Men's Club, Memphis.

11:30 a. m.—Report of Committees.

Election of Officers.

Adjournment.

SECTIONAL PROGRAMS

Home Makers' Section

Home Makers' Hall

TUESDAY, MAY 16, 1916

2:00 p. m.—Call to Order.

Music.

President's Remarks. Mrs. W. B. Stokely, Newport, Tenn.

Appointment of Committees.

2:30 p. m.—Greetings from the Presidents of the Middle and West Tennessee Home Makers' Sections. Mrs. Joe G. Mason, Prospect, Tenn.; Mrs. J. D. Ellis, Dresden, Tenn.

3:00 p. m.—Prevention of Typhoid. Mrs. Lena A. Warner, Specialist in Health for Girls and Women, Division of Extension.

3:30 p. m.—Beautifying Home Grounds. Prof. Charles A. Keffer, Director Division of Extension.

4:00 p. m.—Social Hour.

WEDNESDAY, MAY 17, 1916

9:00 a. m.—Business Meeting.

9:30 a. m.—The Women's Department of the Division of Extension. Miss Virginia P. Moore, Assistant Director, Home Economics, Division of Extension.

10:00 a. m.—Address. Miss Jessie Field, Secretary for Rural Work, National Y. W. C. A., New York, N. Y.

1:30 p. m.—Representatives from the Canning Clubs:

Song, "The Girl with the Hoe."

Recitation, "The House by the Side of the Road."

What the Club Work Has Meant to Me. Sallie Mountcastle, Anderson County.

What Our Club at Liberty is Doing. Maggie Whaley, Bradley County.

2:00 p. m.—Round Table. Social Life in Our Community. County Vice-Presidents.

3:00 p. m.—Dialogue. How the Other Half Lives. Mrs. J. A. Reagan and Mrs. C. O. Browder.

3:30 p. m.—Adoption of Commercial Patterns. Miss Olive Harriss, Asst. Professor of Domestic Art, University of Tennessee.

4:00 p. m.—A Neglected Part of the Farm Dinner, with Demonstration. Miss Geneva Conway, Specialist in Home Economics, Division of Extension. Assisted by Miss Margueritte Robinson, County Agent, Campbell County, and Miss Elsie M. Dugger, County Agent, Claiborne County.

Canning Club Section

Home Makers' Hall

THURSDAY, MAY 18, 1916

9:00 a. m.—Round Table led by Mrs. J. R. Lauderbach. Every county agent will have two girls from her county ready to take part, they to report on the work in the county.

10:00 a. m.—Business Session. Election of Officers, etc.

10:30 a. m.—Address. Miss Virginia P. Moore, Asst. Director, Home Economics, Division of Extension.

General Farm and Live Stock Section

Temple Hall

WEDNESDAY, MAY 17

(All Sections will adjourn promptly at 10:45 for the address of Hon. Carl Vrooman, at 11:00 a. m.)

Prof. C. A. Willson Presiding

8:30 a. m.—Permanent Pastures. Mr. J. E. Hite, Asst. Agricultural Agent N. C. & St. L. R. R., Nashville.

9:15 a. m.—Feeding Small Lots of Cattle. H. R. Duncan, Asst. Professor Animal Husbandry, University of Tennessee.

9:45 a. m.—Can the 100 to 200-Acre Farmer Afford to Raise Beef Cattle. C. A. Willson, Prof. of Animal Husbandry, University of Tennessee.

10:30 a. m.—Election of Section Officers.

Dairy Section

Implement Building

8:30 a. m.—Cheese Factories for Mountain Valleys. G. N. Tobey, Division of Extension.

9:15 a. m.—What Income May Be Expected From Dairy Farming. Lee Feezell, Maryville, Tenn.

9:45 a. m.—Japan Clover and Other Pastures for the Dairy Herd in July and August. D. F. Bolton, Limestone.

10:15 a. m.—The Cream Route. C. A. Hutton, Division of Extension.

Horticultural Section

The Farmers' Garden—With Demonstration

8:30 a. m.—Inspection of Gardens, Department of Horticulture, University of Tennessee.

Election of Officers.

Boys' Corn Club Section

Main Floor, Dairy Barn

8:30 a. m.—Address. Prof. C. A. Keffer, Director, Division of Extension.

Address. The Boy and the Man. Hon. Bradford Knapp, Chief, Office of Extension Work in the South, U. S. Department of Agriculture, Washington, D. C.

How I Grew My Crop of Corn. George Keller, Green County. Rufus Shinliver, Anderson County.

What I Have Learned in the Corn Club Work. Herchell Massey, Hamilton County. Carlton Bise, Knox County.

Corn Judging Contest. Conducted by Prof. J. C. Pridmore and J. C. McAmis.

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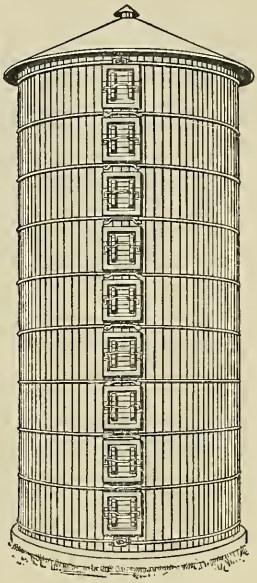

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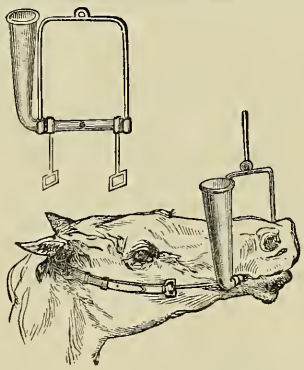

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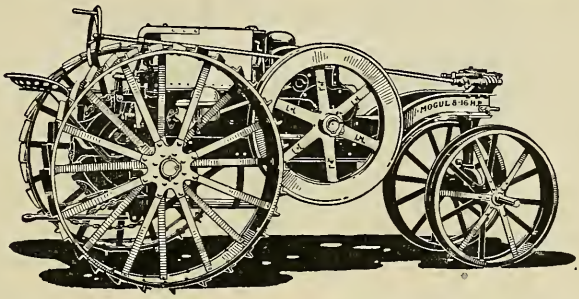

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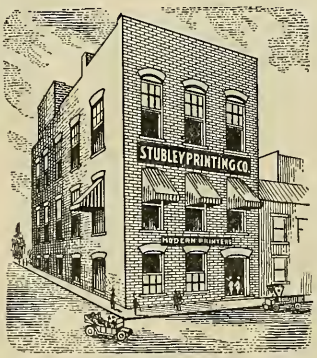

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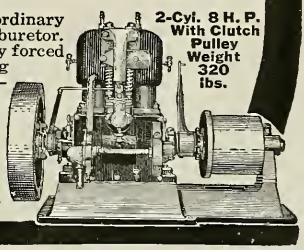

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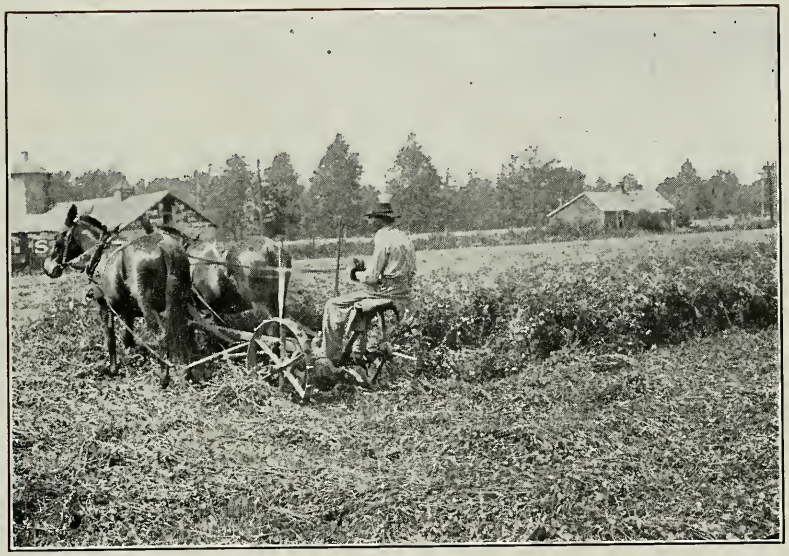

MAKING HAY IN WEST TENNESSEE

Vol. X JUNE, 1916 No. 9

Published Monthly By

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Contents

Obituary ---------- 262

The Torrens System ---------- 263
C. Hillman Moody, '17

Three Year Results of Silage Experiments at Tennessee Experiment Station ---------- 266
W. E. Bullington, '18

Poultry In Tennessee ---------- 268
L. S. Hale, '18

Summer Feeding of Dairy Cows ---------- 270
C. R. Haynes, '18

Selecting Tested Sires ---------- 274
W. A. Shadow, '17

Is Dynamiting for Tree Planting Profitable? ---------- 277
A. Jesse Winegar, '16

Rest Rooms for Country Women ---------- 279
Lucile Henry, '17

Amusements for Farm Boys and Girls ---------- 280
Sara Durnell, '17

News ---------- 281

Editorial ---------- 283

Paris Austin Bryant

THE students of the University were shocked to hear of the sudden death of Paris Austin Bryant on Tuesday, May 2nd. Mr. Bryant was a Sophomore in the Agricultural Department and had just passed his 21st birthday when he died of pneumonia. While at the University he made many friends and took an active part in the Agricultural Club, Y. M. C. A. and athletics. His home is at Tyner, Hamilton County, Tennessee. On Wednesday all classes were suspended and the students met in chapel to show their respect to the beloved student. The following resolutions were adopted:

Resolution

Whereas, the Heavenly Father has seen fit to take from among us our respected and beloved student, Paris A. Bryant, while in the midst of life's work and pleasures, be it

Resolved, That the students and members of the faculty of the University of Tennessee extend their sincere and heartfelt sympathy to the grief stricken members of his family, and be it further

Resolved, That a copy of these resolutions be sent to the bereaved family, and that a copy be placed upon the records of the Agricultural Club, of which the deceased was a faithful member, and further that they be published in the U. of T. Farmer and in the Orange and White.

J. C. PRIDMORE,
C. A. WILLSON,
W. P. DAVIDSON,
L. C. PACE,
Committee.

THE U. T. FARMER

Vol. X | JUNE, 1916 | No. 9

THE TORRENS SYSTEM

C. Hillman Moody, '17

The next legislature of Tennessee will probably consider the adoption of the Torrens system of land registration. There are those who for selfish interests will oppose the measure; while it will be supported by men with unselfish motives, who wish to see the land of this State developed and increased in commercial value through the adoption of a short, clear and certain system of registration and transfer of real estate titles.

The Torrens system is named for Sir Robert Torrens, who introduced it in South Australia in 1858. With certain amendments and modifications the system is now in use in Japan, England, Canada and in one-fourth of the United States, while a similar system is used in Australia and Germany. This wide popularity is due to its strength and to its simplicity. It is strong in that the state examines and guarantees every title so registered, its simplicity lies in the fact that every transaction is registered in plain English, devoid of long legal phrases, while a duplicate certificate is issued to the owner and becomes undisputed proof of ownership. The system is further simplified by the fact that all transactions are noted on one page of the registry so that the condition of any title can be ascertained on brief examination.

Illinois was one of the pioneer states in adopting a modification of the Torrens system adapted to conditions in the United States. In the procedure of registration the owner first files an application, stating name, age, residence and marital condition. To this is added the consent of his wife, if any, and a description of the property, a list of all heirs and encumbrances, and the name and address of all known interested parties. If there are unknown heirs or interested persons the fact is so stated. This application is referred to an Examiner who examines the deed and all records back to the original grant, as is done in making out an abstract of title, and then he may recommend a guarantee by the court. Next a suit is introduced "against the world," all parties interested being made defendants. Notice of the application for title is served through the newspapers and any unknown parties are urged to come forward at once. By this means the court endeavors to find the true owner and then instructs the entrance of a decree in the Torrens registry showing in whom the land is vested. At the top of

the page is written the simple statement as to the ownership of the land, followed by a brief description thereof. Underneath appears a simple memorandum of every change or encumbrance upon the land. Thus the long and tedious forms now required recorded are dispensed with and every record relating to one piece of property is carefully noted on one page. A duplicate of this is issued to the owner and becomes conclusive proof of ownership.

Since the state guarantees the title, it follows that there must be an indemnity fund. This is created by a tax of one-tenth of one per cent of the value of the land at the time of registration. If another man comes forward with proof that he is the rightful owner of a piece of property so registered, he may sue the state for the full amount of his loss on account of such incorrect registration. All such losses are paid from this indemnity fund. But the losses are few; for the state does not guarantee a title until it has been examined thoroughly by experts. So certain has been the establishment of these titles in Illinois that there has been no such loss since 1897. Australia has over $700,000,000.00 of land registered under the Torrens system and claims against the indemnity fund have amounted to less than one hundredth of one per cent.

In case of any transfer of this land the ordinary deed and the owner's duplicate certificate are presented to the registrar who satisfies himself as to the identity of the parties and the genuineness of the signatures. The new owner is issued a duplicate certificate while the certificate of the former owner is cancelled in the registry. Whenever entry is made in the registry, a similar memorandum must be made on the owner's duplicate. If this is lost or destroyed, a new one may be issued by the registrar and the fact noted on the registry, and on the new certificate.

In case of mortgage, the mortgage is made in duplicate. The mortgager gives the mortgage and duplicate, his note and certificate of ownership to the lender who inspects them and lends the money. The original mortgage is kept on file while the duplicate mortgage is given to the mortgagee. The owner's duplicate is returned to the borrower after a memorandum of the fact of the mortgage has been noted on it and on the registry. Here the Torrens system saves great space in the records. Since the ideal of the system is to show the nature of the title on one page, only a memorandum is made on that page with a reference to the proper document, which is kept on file.

Torrens vs. Present System

Time—Under the present system from three to four weeks are usually spent by lawyers inspecting titles for a land transfer. It is said that "six months and a lawsuit" are required to dispose of a piece of land. Under the Torrens system a transfer may be effected in a day or two without going back over the old musty records, for under this system these have been thoroughly examined and passed

on by the state once and for all. The exact condition of the title may be determined by inspecting one page of one book in the registrar's office.

Cost—Under the present system both parties to a land transfer must employ lawyers to examine deeds and prepare abstracts of title back to the original grant from the state. A charge of two hundred fifty dollars is frequently made for one such abstract, with each succeeding transfer this work and expense is repeated. With the Torrens system this is eliminated. The state prepares one abstract of title and guarantees it to be correct. The expense is covered in the original cost of registry, which, in Illinois, is $24.00. Thereafter there is a cost of $2.00 for each transfer and registry of deed.

Complexity—The phraseology of any old deed is found to be complicated with cumbrous legal termiology and professional phrases which are entirely unnecessary. The Torrens system states plain facts in few words and uses phrases for paragraphs and sentences for pages.

Boundaries—Stones, trees, black oak pointers, small creeks, the tops of ridges and the foot of mountains are used as boundaries under our older systems and few men can locate the actual boundary lines. The Torrens system usually requires an accurate survey with the corners marked by iron posts, stones or concrete.

Fraud—Everyone knows of some case in his own community where the owner of a tract of land has lost it through the trickery of some land shark or unscrupulous lawyer. Such practices are of frequent occurrence and relatively easy under the present antiquated land laws of Tennessee. Obscure heirs and holders of old grants may now show up at any time and through some technical point deprive a man of his house and home. Under the Torrens system all such heirs must make their claims known by a given time or forever hold their peace.

Certainty—Through the recklessness of the state in issuing early land grants of immense tracts with vague boundaries, many of these tracts overlap and the same piece of land is often claimed by a dozen persons. This is especially true in the mountain lands of East Tennessee, where many thousands of acres of valuable coal and timber lands have remained undeveloped because of uncertain titles. Under the Torren system the matter would be threshed out in the courts, the claims of the dead and missing heirs dropped and those of the disputing claimants presented for a fair settlement before the court until the ownership is clear and so recorded on the books. After this there will be no more delving into musty records for obscure claims due to early grants.

Loans—It is often said that land is the best security for a loan. But in Tennessee, with our antique and uncertain system of land title registration, this is not the case. Investors, banks and insurance companies have loaned money on val-

uable real estate as ample security with the result that they have lost the entire amount on account of uncertain titles on the claims of obscure heirs. Naturally the business men have become wary and in many sections of Tennessee, land owners who would borrow on the security of their real estate learn to their surprise and chagrin that in the judgment of business men land is not the best security. This is due to our present system of land laws and may be remedied by the adoption of the Torrens system, under which the owner's duplicate represents absolute security in the form of a .piece of property with an undisputed title guaranteed by the state.

The Torrens system has cleared the title and increased the value of many thousands of acres of land in other states. There are many large and valuable tracts of land all over Tennessee which are undeveloped and unimproved because of obscure titles. Capitalists are afraid of much of our land as security for loans or for investments and the Torrens system is needed to straighten out these matters and to place our land where it belongs in the records of the registrar and in the sound judgment of the man of business.

Note—Since the above article was written the East Tennessee Farmers' Convention and Institute in forty-third annual convention, assembled adopted the following resolution:

"Progressive states in our Union are adopting land title systems which simplify the transfer of titles, secure land owners in possession of their holdings and pave the way for the enactment of a rural credit system so badly needed by our farmers. We call upon our next legislature to pass a bill embodying the principles of the Torrens land title system, and instruct our legislators to fight for this at Nashville." This is a good step in the right direction and it is hoped that other influential organizations will make similar recommendations and requests of our legislators until we have the Torrens system in Tennessee.

THREE YEAR RESULTS OF SILAGE EXPERIMENTS AT TENNESSEE EXPERIMENT STATION

W. E. Bullington, '18

It is now time to begin seriously to think of, and to plan the coming silage crop. There are many crops which may be used for silage, but the question is, which one will give the greatest yield of the best quality of silage for time and money expended? What rate of seeding of this one crop will give best returns?

Clover, beans, peas, alfalfa, etc., are sometimes used, but experiments show that this is poor practice since they are best made into hay and fed as such. The hollow stems of grains afford greater air space and hence give more trouble in packing as all the air must be forced out or the silage will mould.

Corn, it seems, is the one crop used most extensively for silage purposes throughout the country. Sorghum, however, has proven to be a very heavy yielder, regardless of the season, and deserves thoughtful attention.

The Tennessee Experiment Station at Knoxville has been carrying on some acre experiments for the last few years, 1913, 14 and 15, to determine what the best silage crops are for this section of the country, and also what rate of seeding of these crops gives best yields. The results of the experiments are given below.

READY FOR THE SILO

	3 Yr. Average Yield in Tons
Acre No. 1—16 lbs. corn, 10 lbs. sorghum, and 35 lbs. cowpeas	11.97
Acre No. 2—5 lbs. corn, 5 lbs. sorghum, and 30 lbs. cowpeas	10.84
Acre No. 3—10 lbs. corn, 10 lbs. sorghum, and 35 lbs. soy beans	13.11
Acre No. 4—5 lbs. corn, 5 lbs. sorghum, and 30 lbs. soy beans	10.41
Acre No. 5—5½ lbs. sorghum	13.70
Acre No. 6—10 lbs. sorghum	14.19
Acre No. 7—10 lbs. corn	9.74
Acre No. 8—20 lbs. corn	12.01

It will be noticed that Acre No. 7, planted to corn alone at the rate of 10 lbs. to the acre gave the lowest yield but in increasing amount seeded to 20 lbs., shown in No. 8, the yield was increased 2.27 tons, thus favoring the heavier planting.

Acre No. 4, with light seeding of corn, sorghum, and soy beans,

gave next lowest yield, but when the amounts of corn and sorghum seeded were doubled, and the number of pounds of soy beans were increased one-sixth, the yield increased from 10.41 tons per acre to 13.11 tons per acre or 2.7 tons increase.

Acre No. 2, with the same materials as No. 4 except that the cowpeas take the place of the soy beans yielded 10.84 tons or an increase over acre No. 4 of .43 ton or 860 lbs., which must be attributed to the cowpeas. When the seeding was practically doubled the yield was increased, in this case 1.03 tons. It is noticed here that the thicker sowing of the soy beans gave a greater average yield by 1.14 tons than did the thicker seeding of the cowpeas, or just the opposite of the results of the light seeding.

Acre No. 5, with 5½ lbs. sorghum gave a greater average yield by .59 ton or 1180 lbs. than the heaviest yield of either of the others noticed, and when this seeding was doubled, as seen in Acre No. 6, the increase over the light seeding of .49 ton or 980 lbs. was received. Thus in every case the thicker seeding gave an increase over the light seeding.

According to these experiments sorghum seems to be the best silage crop for Tennessee. It produced 2.18 tons greater yield per acre than the highest yielding acre of corn, and, compared ton for ton has been proven to be practically as valuable when cut at the proper stage. Experiments also show silage to be worth from $3.00 to $6.00 per ton, hence counting the value of this silage at the lowest figure, sorghum gave a profit of $6.54 per acre over the corn, a fact well worth noting.

In comparing the sorghum silage with the silage of the mixture of corn, sorghum and soy beans or peas, sorghum still produces the greatest yield, but it is thought that the peas and the beans add to the value of the silage in the protein content. This, however, is very slight, and the mixing may do more harm than good. It is more trouble to harvest, and if not packed carefully into the silo is likely to cause moulding of all. Therefore in considering everything it might be well for the farmer to give sorghum a thorough test.

POULTRY IN TENNESSEE

L. S. Hale, '18

In the last few years the poultry industry in certain sections of Tennessee has shown a very desirable improvement. In other parts of the state, however, the poultry business is still in a very unsatisfactory condition.

The counties which stand highest in the poultry industry in Tennessee are, as would be expected, those in which the Extension Department has done a great deal to assist in establishing the business. There are fourteen of these counties in the state in which the Extension Department is now carry-

ing on poultry club work. These counties, as shown by a recent statement from the Department, are representative counties from the three sections of the state.

Hamblen County is one of the most important counties in the state from the standpoint of poultry production. In this county there is great interest and activity among the junior members of the poultry club. The senior members of the club are organzied into the Hamblen County White Eggs Farm Club. This club produces only non-fertile white eggs of the highest quality. The Extension Department reports that the club members have cooperated in their buying, as well as in their selling operations, with the result that much expense has been avoided in the purchase of supplies.

The poultry industry in Hamblen County ranges all the way from the very small home flock up to the large commercial poultry plant at Morristown.

Besides the commercial poultry plant at Morristown there are several similar plants in other parts of the state. There is doubtless a large and profitable field in the poultry industry for the commercial plant, but what is chiefly desired is a wider interest throughout the state in pure-bred poultry raising on the farm.

One great reason, perhaps, why more attention has not been paid to poultry raising is that people generally have not known or appreciated the returns possible in the business when properly handled. There are many instances that might be given to show the profits to be had from poultry. One such instance given by the Extension Department is that of a young lady in Shelby County who in two years realized from a flock of sixty-five hens a profit sufficient to pay for the installation of a home system of water works.

It has been estimated by some very conservative poultry raisers that the profit from eight to ten hens, when properly bred and cared for, will equal the average profit realized on a first class beef steer. When we remember that the cost of the steer may be sixty dollars or more and the cost of the ten hens not over ten or fifteen dollars, it is not difficult to see that the greater percentage of profit is in the poultry.

But from the above statements it must not be understood that the path of the poultry keeper is free from troubles. Nor is it intended here to give the impression that stock feeding should be given up for poultry raising.

One of the greatest obstacles to successful poultry raising is the too general idea that it is a mere side line, and not worth the intelligent and persistent attention which, alone, will insure profitable returns. When people generally realize that poultry raising is a business in itself, whether on a large scale or a small one, requiring the application of sound business principles, the poultry industry will begin to prosper as it should.

The particular branch of the poultry business which one may take up is a question to be determined by local conditions, markets,

etc. On many poultry farms the production of high class eggs for table use is the chief object. In other places the production of broilers is given most attention. The production of eggs for hatching and breeding stock has been found to be a very profitable line of the poultry business for many people. It requires, however, several years to establish a reputation as a successful breeder of poultry.

One branch of the poultry business which deserves more attention than it now receives is the production of capons. On the same amount of feed a capon will produce more weight and much greater market value than an ordinary broiler. The market demand for capons far exceeds the supply.

In general it may be said that on the average farm, poultry raising can be made one of the principal sources of income, instead of the neglected business it so often is at present. Any person who takes up the business properly and gives it the persistent, intelligent attention it demands will be assured of good returns on the investment.

SUMMER FEEDING OF DAIRY COWS

C. R. Haynes, '18

Every dairyman welcomes the approach of spring when he can turn his cows out to pasture and a large part of the labor and expense connected with winter feeding is done away with. It is during summer that the dairyman expects to realize the cheapest gains and the most economical productions. The question of feeding dairy cows during summer brings up the subject of pasturing, soiling crops and silage.

In order to produce cheap live stock or their products, as pork, beef, poultry, eggs, milk and butter, it is generally necessary for the grower to provide abundant pasture throughout a greater part of the year. If pasture is supplied, the cost of supplementary feeds—certainly during the spring, summer and early fall months—may be reduced to a relatively small item.

The proper provisions of home-grown feeds for the dairy cow during the summer months does not receive the consideration that it should. Rarely does one feeding for milk production enter upon the winter feeding period with as much uncertainty as to his feed supply as he does upon the summer feeding period. This is due to the fact that the summer feed ordinarily is not produced far in advance of the time when it is needed, and thus one has to reckon with the uncertainty of the season, coupled in many instances with a more or less hasty judgment of what actually will be needed. That the summer feed should be largely of a succulent nature is shown by the increase in milk production resulting, when cows are turned to pature and by the favorable physical effect produced on the animal after becomming accustomed to such feeds.

Combinations of grasses and clovers that begin growth early in

the spring and grow throughout the summer and early fall months are the most desirable. Such mixtures should include grasses that attain their maximum development in succession throughout the greater part of the year, so that under normal conditions abundant grazing will always be afforded. Such grasses as Kentucky blue grass, timothy, orchard grass, red top, Bermuda, tall meadow oats and some clovers as red, white, mammoth, alfalfa, alsike, and Japan will be found suitable for making these pastures.

However, this ideal pasture is rarely ever obtained, and the practice of setting aside a certain number of acres of tillable land for meadow at the beginning of the season for pasture, very seldom gives desired results unless the season happens to be a favorable one. Even so, it is very difficult to estimate the acreage that will be necessary without an excess or a deficiency. The amount of land to set aside per cow will vary from one to three, or more acres, depending upon the value of the meadow and upon the season. It often happens that the starting with a good pasture of sufficient acreage makes little difference when the period of drouth is on.

Not so many years ago dairy cows derived their feed entirely from pasture during the summer months. There may have been more pasture available then, the pastures may have been better, or else the cows were not fed as well as at present. Possibly all three factors influenced the question.

GOOD SUMMER FEED FOR DAIRY COWS

At the present time many dairymen feed their cows all or a part of the summer months. Other dairymen question the advisability of this practice. There is no question but that a cow will produce more milk if fed grain while on pasture, and if large yield is of more importance than economy of

production, grain certainly should be fed. According to investigations conducted at a number of experiment stations, feeding grain to cows while on pasture will not produce enough increase in the milk flow to pay for itself directly unless the pasture is very poor and only a small amount of grain is fed. The greatest value of feeding grain while on pasture lies in the fact that the cows will go into the winter in good shape and not be so run-down that extra feed will be needed in order to get them started again. And as one old dairyman said, "it will also prevent 'hollow horn,' 'hollow tail' and 'hollow stomachs.'" If the cows go into winter in good shape they will produce more milk during the winter than if they were poorly fed during the summer. And again, when the milk flow decreases during the summer it is difficult to restore it to its normal flow later, hence the value of summer feeding.

The kind and amount of grain to feed depends on the amount of milk the cow is producing and on the pasture, and each man must decide the question for himself after experience. The cow that gives a small or average amount of milk will produce but little more, if fed grain while on pasture. But, with the heavy-producing cow, the case is quite different, and it is necessary that she be fed some grain if she is to continue to produce a good flow of milk. The necessity of feeding grain to the high-producing cow arises from the fact that the grasses are so bulky that she cannot secure a sufficient amount of nutrients from grass alone, and must have some concentrated feed in order to continue to produce large quantities of milk. The practice of a large number of dairymen is to feed one pound of grain per day to about each six or seven pounds of milk produced daily while the pastures are good. As the pastures become dry this amount is increased accordingly. When feeding only a small amount of grain it is fed once a day, usually in the evening. On account of the comparative narrow nutritive value of grass, corn is a good grain to feed when small quantities are fed as it does not unbalance the ration, and corn is one of the most economical feeds to use on the average farm. However, when over five or six pounds of grain is fed, some protein feed, as bran, cottonseed meal, oats or gluten meal should compose part of the ration. In feeding dairy cows the importance of liberal feeding is difficult to overestimate. Every one who feeds animals should thoroughly comprehend that, first of all, the animal must use a certain proportion of its food to maintain the body. This is the first requirement of the animal, and it is the first use to which it puts its food. This is called the ration of maintenance and it is practically a fixed amount. Feed consumed over this amount goes toward milk-production until a point is reached when a part of the food goes toward producing fat. It is necessary to feed to the point when the cow begins to put on fat for her to attain her greatest efficiency.

In changing from dry feed to

grass, it is best to go somewhat slowly, especially with the heavy-milking cows. The young, immature grass, such as we have in early spring, contains a large amount of water and a small amount of dry matter, and it is almost impossible for a heavy-milking cow to eat enough of such feed to supply the necessary amount of nutrients and the cows should receive about half of their regular ration of grain. Another reason for putting cattle on pasture gradually rather than suddenly is the effect on the taste of the milk. When a cow is changed at once from a grain ration to grass, a very marked taste is developed in the milk, while if the change is made gradually, the change in the taste of the milk is scarely noticed.

From about the middle of May to the latter part of June grasses are at their best and it rarely pays to feed much grain at this time. Later in the summer when the grass begins to dry up and the grass plants are likely to grow hard and fibrous some grain should be fed and continued throughout the summer unless there is sufficient pasture produced by the second growth of clover and the clover seeding in the stubble field. If the pasture becomes very short the grain should be supplemented with silage or some soiling crop.

It thus becomes evident that the relying on pasture alone has an element of uncertainity in it. This with the increasing value of land, together with a consideration of the yield of crops, were the land cultivated, makes the pasturing of tillable land expensive. With these things in mind it is evident that one should plan to pasture less and supplement more from other sources.

One method of supplementing is by the use of soiling crops. By soiling is meant the cutting and feeding of crops in the green state. Thus there is a partial and complete soiling, depending as to whether the soiling crops are being relied on partially or entirely. Compared with pasturing, two disadvantages of soiling would be the difficulty of figuring out a cropping plan, and the requiring of more labor to raise and feed and get it to the cows; some of the advantages of soiling would be that less fencing would be required larger yields of nutrients per acre would be obtained and if the proper acreage of crops were seeded the supply of feed would be constant and any excess could be fed green or cured for hay.

A second method of supplementing pasturing, which is growing in favor, and one that is most practical under the average condition, is the use of silage. The summer silo is fast becomming popular and even necessary because of its splendid aid in supplementing summer pastures and tiding the herd over the periods of drouth. Experiment stations strongly advocate its use and some of the leading agricultural papers have been speaking in no uncertain voices of its advantages. Among dairymen who have used summer silage for many years, permanent pastures have been greatly reduced or even entirely dispensed with. One and

one-half to two acres of tillable land, which at a conservative estimate is necessary to pasture a cow during the summer, will furnish on the average about 10 tons of silage per acre, the two furinshing silage enough to feed three cows at the rate of 35 pounds per cow per day for the entire year, or six cows for six months. Enough silage to keep a cow during its pasture season can be grown on from one-fourth to one-third the area required to keep the same animal on pasture. This does not mean that silage should form the entire ration, but because of the ease which it may be fed and because of the large yield of nutrients per acre, and the certainty of having succulent feed during droughts, it is finding its place in the summer as well as in the winter ration. Thus, the practice of combining some pasturing with the use of silage lessens the number of acres required to furnish th eamount of feed necessary and makes the supply of summer feed surer than where pasture alone is relied upon.

In addition to pasture, silage and grain during summer the cow should not suffer for water. She is a small milk factory and the large percent of milk is water, so supply her with abundance of water that she may have it when she pleases. A good windmill, or engine, and tank, a good spring, a creek or a river will supply the right kind of water. Do not allow the milk cows access to an old pond where they will stand in the heat of the day and then drink the water. Milk manufactured from such germ laden water will not be healthful for those who may drink it.

This leads to the point of proper shade for the cow in the pasture during warm weather. The cow that must stand out in the hot sun all day can not be a very good milker. She should have shade even if it must be artificial. The cow in pasture should also have free access to plenty of salt. She needs it every day, and if you put out a lump of rock salt on the ground or in a trough you will find that she will go to it and lick some every day. She knows how much she needs, and you should let her have it.

SELECTING TESTED SIRES

W. A. Shadow, '17

From a financial standpoint we all realize how important it is to test the individual milk-producer before she is kept with the idea of making a profit. Different theorists have a large range of ideas about the amount of influence each parent has on the offspring; but according to the laws of heredity the male has just as much influence as the female. Individuals will differ greatly in their ability to stamp their characteristics on their offspring. In accordance with this fact the skillful breeder must test the sire before he can be used to any great extent in his highly developed herd. To test a sire he must be bred on several of the good cows in a herd and the aver-

age milk production of the offsprings compared with production of the dams at the same period.

First of all, the bull selected should be a pure-bred animal of the breed to which the cow belongs, or in case of grading up, of the breed selected as best suiting the purpose. The dairy cow of today has been developed until she produces many times the product of her ancestors, and is really abnormal in this respect. This power of producing large quantities of milk is an hereditary character that has been developed by selection, is not at all dominant in most cases and may be easily lost; and in many cases we find cows reverting back to poor milkers of the older type. There is no reason to suppose that many of the males do not do the same thing. Just think what disastrous results would follow a good herd that had used a bull of that nature. The cows are constantly culled out of the herd by testing them, so why not cull out our poor sires and use only those that improve the breed.

The startling variation in the transmission of dairy characters is shown by the results from the University of Missouri Jersey herd. In 1884 four registered Jersey cows were purchased, and the entire herd (1910) were decendents from these cows.

The first bull used was Missouri Rioter, a son of Bachelor of St. Lambert. There was no record of the quality of his dam, but his sire was a strong breeder. This bull left four daughters in the herd that have a total of 26 lactation periods, from dams with 23 periods on record. **The average production of the daughters was 1009 pounds of milk and 18 pounds of fat per year below that of their dams.** In every case the daughters were inferior to their dams.

The next bull was Hugorotus, a cheap bull without any high-class animals in his pedigree. This bull had eleven daughters, with a total of 50 lactation periods from dams of equal number of periods. The eleven daughters average 393 pounds of milk below their dams, but produced 14 pounds gain in fat. Six out of the eleven daughters were decidedly inferior to their dams and the general result of using this bull was disastrous. The averages are made as good as they are only by two full sisters sired by this bull that proved to be first-class animals. When the herd was culled nine out of the eleven were sold.

The next bull was Tome of Meridale. This bull had a splendid record of ancestors and his offspring show the results. He had twelve daughters in the herd with a total of 67 lactation periods. Compared with the same periods of their dams a marked increase can be seen. The daughters show an average increase of 1410 pounds of milk and 66 pounds of fat per year over the dams. This was a very valuable sire and his presence in a herd of the quality at Missouri Station meant money to station and development to the herd.

The next bull was Missouri Rioter 3rd, a son of Missouri Rioter. His dam was the best cow in the herd and he had a wonderful grandsire. Missouri Rioter 3rd

has only three daughters with 15 lactation periods. The average increase over the dams was 3230 pounds of milk and 146 pounds of fat per year. The number on test was small but it is plainly seen that it would be safe to use this bull on a very good herd.

Minette Pedro was the next bull at the head of the herd. He was an animal of fine breeding and had several good ancestors. This animal had twenty daughters. Ten of them fell below their dams and ten came above their dams in production. The average gain considering all the daughters was 55 pounds of milk and 4 pounds of fat over that of the dams. On the whole this bull made no improvement of the herd. The offspring seemed to follow the dam in most cases, while with Missouri Rioter 3rd and Lorne of Meridale the daughters were good regardless of the dams.

The last bull in the herd with daughters old enough to admit comparison is Brown Bessie's Registrar. This bull has five daughters, with eight lactation periods. The comparison is made with the corresponding periods of the dams. The data are too limited to mean much as yet, but it is certain his daughters are decidedly inferior compared with the dams. The average decrease of the daughters below the dams is 1724 pounds of milk and 76 pounds of fat. It would be unwise to use this bull in the herd after his value is evident.

It must be understood that the dams and offspring must be kept under similar conditions and given an equal chance to produce as much as possible. It is seen from the record of these bulls that there is an immense difference in the way dairy qualities are transmitted and that selecting a herd bull that can be depended upon is not an easy proposition.

In selecting the sire by all means get one that has a good line of high producing close ancestors. This is especially true if a young bull is selected. A sire that has proven his merits may be a very desirable sire, yet he has very few or no high producing animals among his parents and grandparents. There is also another factor that must be taken into consideration in selecting a sire and that is the possibility of introducing contagious abortion into the herd. The old or tested sire is more likely to do this than is the young male; for the calf is free from the disease even though he comes from a diseased herd.

One of the best plans to get the use of tested sires is for a community to organize a sire testing association in connection with the cow testing association. Then a certain number of good blooded bulls are kept in reserve or used on inferior cows until their value as sires is recognized; and when a sire is found that has exceptional value he should be used to the greatest advantage possible and kept as long as he proves a breeder. A system that would make the selection of sires more certain would surely advance the records of the herds affected.

Dairymen should get together and keep a record of the results of their sires, keep them so they

can get hold of them in case they prove valuable, and when a valuable sire has been used in one herd until undesirable inbreeding is at hand, arrangements can be made for some other herd to have his influence as long as he is effective as a breeder.

IS DYNAMITING FOR TREE PLANTING PROFITABLE?

A. Jesse Winegar, '16

Dynamite has long been used extensively in excavating and in mining operations and recently it is being strongly advocated for various agricultural operations. Its value in connection with fruit tree planting has been so widely advertised by its manufacturers that the orchardist might well believe that its use was absolutely essential in order to insure successful returns from his orchard. It is the purpose of this article not to discredit the claims of the manufacturers of dynamite, but to attempt to point out the relative values of their arguments for its use.

Dynamite, according to record, was first used in planting fruit trees about a quarter of a century ago at La Mesa, California. Here and likewise at the New Jersey Experiment Station, it has been recommended under certain conditions. Many commercial orchardists have likewise used it more or less with varying results. The manufacturers have taken advantage of the opportunity and use favorable statements from these men to further the work. We do not condemn them for doing this—if they will but be modest and fair in their quotations—and such evidence should be given due consideration.

Arthur J. Farley, Assistant Horticulturist of the New Jersey Station, in an article in the November (1915) issue of "The Field" says that the following are advantages in favor of dynamiting.

"First, trees set in dynamited holes develop more rapidly than trees set in the ordinary way. Second, a smaller percentage of trees will fail to grow the first season. Third, trees can be set out with less labor and expense. Forth, the trees will come into bearing one or two years earlier and produce more fruit."

It is reasonable to suppose that trees set in dynamited holes will develop more rapidly than if set in the ordinary way. The roots have access to a larger area of plant-food. This larger area offers less resistance to the roots and thus we get a greater development of the root system. Orchardists need to forget that they are about to plant a tree and imagine that they are going to bury a horse and dig a hole accordingly, remembering that they can plant it but once and that the quantity and quality of the fruit which it is to bear is governed in a great measure by the care in planting. But this point looses in value when we consider the ideal site for the orchard. We should select a loose deep soil, free from the hardpan and having an abundance of plant food and vegetable matter and well drained. Under

such conditions we could not consider the use of dynamite. Again, it is claimed that a smaller percentage will fail to grow the first year. This is due to a greater development during this year. But, on the other hand, this was in the hands of an expert, yet possibly there is no reason why the average individual cannot follow an outlined plan with just as much success. The bad results come from two causes. In dynamiting, a pot hole or cavity is formed in the bottom, this must be filled, also time must be given for the fumes to escape or ill effects will be experienced. This is overcome by dynamiting one day and planting the trees the following day. Again, the soil should never be wet or the physical condition will be impaired.

That trees can be set out with less labor and expense is to be doubted unless we grant that we will get greater returns. It is conceded that less labor is necessary. But the matter of expense is of minor importance since the difference cannot be great with the average farmer.

That trees will come into bearing one or two years earlier and produce more fruit has never been worked out sufficiently for the average conditions to justify the statement generally. However, the general view is taken that this is true; but until we have definite work done by ourselves or by our experiment stations bearing upon this point we should hesitate before making a statement to this effect.

That it destroys fungus, nematodes and certain orchard soil diseases is doubted seriously. It is a statement from the manufacturer, based on nothing other than opinion. It comes from one who did not stop to consider that if the disease producers were killed that likewise, nitrogen gathering and other beneficial organisms would be killed. He did not stop to consider that animal life is essential to the best physical condition of the soil. Then if their claims are based on facts we should think seriously of discouraging the use of dynamite. But there seems to be no facts on which to base this statement.

In conclusion we would say that it is to be hoped that our experiment stations will soon be able to make some experiments whereby they may be able to recommend something definite to us on this point, filling conditions both generally and specifically. But as yet we do not feel justified in reccommending the general use of dynamite in the planting of fruit trees as a guarantee for greater returns and more successful results. However, if the individual desires to make a personal demonstration of its values we would encourage him because this is a question of considerable comment and importance and is worthy of a trial. The practice of farm experiments is to be encouraged, but the one making the experiments should follow carefully the best methods for the particular experiment in hand and in addition he should prepare full notes on the work and results as a matter of permanent record.

REST ROOMS FOR COUNTRY WOMEN

Lucile Henry, '17

There was a time when our country woman, on coming to town would have to stand around all day on the streets, waiting for her husband to sell his produce and do his shopping, before she could return home. It is no wonder that she preferred her life of solitude rather than be lured to the hot, dirty city with its rush and whirl of a busy life. The paved streets, electric lights, and stores so prettily decorated with Dame Fashion's latest designs soon fatigue the quiet soul of the unpretentious country woman, and make her long for her secluded little farm home nestled among the hills.

Fortunately we are waking up to the country woman's need of rest and comfort when she comes to town, and are now providing her a place to rest through the long weary hours that she formerly spent on the streets. Rest rooms for country women are in many of our market towns. The first of these in Tennessee was at Greeneville. Here it was seen that something must be done for the country women's comfort, so as an experiment they provided them with a rest-room, which proved very successful and beneficial.

In Knoxville, a little less than a year ago, some of the citizens became interested in rest-rooms. They petitioned for an appropriation out of the city public fund, which was granted; then through the interest and help of club women, a room for this purpose was prepared on the second floor of the Market House. This room is about forty feet by twenty feet, well lighted by electricity, ventilated by four large windows, and heated by steam. The floors and walls are painted in soft tones. There are three rockers and twelve straight back chairs, a wicker couch, and two tables, on which are many current magazines and some Bibles donated by interested parties. Window-boxes filled with flowers decorate the windows, while on the walls hang a clock, calendar, and picture.

Adjoining this room is a modern, well equipped, sanitary lavatory. A maid is always in the rest room, keeping things in order and making comfortable the women and children who visit the room.

To be sure this rest-room could be greatly improved, yet as it stands it proves very beneficial. Not only is it visited by country women who come to town, but by business women, motorists, and many others who desire a place to rest.

Besides affording the country woman a resting place it gives her an opportunity to meet the city woman and discuss with her their mutual problems.

AMUSEMENTS FOR FARM BOYS AND GIRLS

Sara Durnell, '17

There is a problem before the father and mother of the farm boys and girls of today. The boys and girls must be given such training as will develop their lives in the most rounded, symmetrical way. This must be done by giving them work, play, recreation and social intercourse.

What kind of play and amusements can the boys and girls be given? What is the best way to conduct their activities?

A great deal could be said on the subject of the County Y. M. C. A., and it is a work which might well be started by some of the university boys in their home communities this summer. One could be organized in almost every community.

Get a committee of men who are interested in boys, and who can look after the financial end of the work. It is not the object to have a great deal of property requiring large sums for maintenance. It is best, however, if a definite meeting place can be had.

Select a leader for the county. If possible he should have had some experience in Y. M. C. A. work and it is understood that he is a lover of boys and interested in them. Then leaders for each community should be selected.

When the leaders have been selected, a good way to get the boys interested is to have an athletic meet. The leaders must personally see the boys and get them to be present.

From this it will be easy to organize athletic clubs, debating and literary societies. The subjects for discussion should be home problems, things which come up in the lives of the boys.

After the club work is well started, the boys might give a reception or party or supper and invite their friends and parents, showing them what they have accomplished. This end, if kept in view, may act as an incentive to some of the boys.

Exhibitions might be held once a year. One boy may have some prize corn, one may have some curios, still another may have other things of interest to exhibit. The boys will look forward to this all the year, and be collecting things which they think will be of interest.

Summer camps for the boys can be conducted. Most any farmer, when he sees the benefit to the boy, will pay his expenses for a week or so, and spare him from the farm work. The boy will repay it in the enthusiasm with which he does his work on his return.

It seems to be the opinion that girls do not need to be amused as much as the boys. If they are to be kept contented with the farm life, they must have something to do besides house work.

The girls might have a Y. W. C. A. corresponding with the work of the boys. Joint meetings of the boys and girls could be held. These

might be entirely social or occasionally a meeting of a literary type. A good, live committee is needed to plan games and amusements of a wholesome type.

Another form of amusement for both boys and girls, and they will get together, is tennis. Two or three community courts could be made. The boys would be willing to work for a short time to make a court which, if not as smooth as some, will be good enough to play on. They will soon have it packed hard and smooth. The courts should be situated near some home, where some one can oversee the play generally.

The boys and girls who have been in school here, and who, through their intercourse with others, have had advantages which those at home have not had, can carry a great deal of enthusiasm back to their home communities. They could organize and carry out some of this work or any other with which they have had some experience.

If we want to keep the boys and girls on the farm we must give them a chance to mix a little wholesome play with their work.

NEWS

The East Tennessee Farmers' Convention, which was held at O. P. Temple Hall, May 16, 17, and 18, was the biggest and best of any ever held in Tennessee. The program was the best and the interest keenest of any on record. Mr. Vrooman of Washington was more than pleased with the unusual spirit of receptivity shown by the people. Miss Jessie Fields, who has been attending agricultural meetings all over the United States says that Wisconsin has developed its system of agricultural meetings and community work further than any other state, but she has never been to a meeting anywhere that will compare with this Farmers' Convention in attendance and interest. The officers elected for the coming year are: Pres., W. C. Shaw, Roane County; Vice-Pres., N. P. Earnest, Greene County; Sec.-Treas., H. A. Morgan, Knoxville; Asst. Sec., Chas. A. Keffer, Knoxville.

The Canning Club and Boys' Corn Club were features of the Convention. Mrs. E. W. Lauderbach had charge of the round table in which girls from each county told of work being done in their home counties.

Miss Sarah L. Kinsey, who has done excellent work for the Division of Extension has reluctantly resigned her position as District Agent for West Tennessee. Miss Kinsey expects to marry soon. Miss Martha Thomas, of Brownsville, Tennessee, and sister of A. G. Thomas of the University, has been appointed to take Miss Kinsey's place. Miss Thomas graduates at Columbia this year.

The splendid spirit of the Vice-Presidents of the Farmers' Convention was shown through their

action in offering an automobile as a present to Prof. Morgan for the work that he has done for the farmers of East Tennessee. The splendid spirit of Prof. Morgan was shown in refusing to accept the present, his contention being that the money should be used for purposes of more direct benefit to the farmers of the convention.

The U. T. Cooperative Creamery made over 10,000 pounds of butter during the month of May. Last year the production for the same month was 5,258 pounds. The business has grown so that the creamery is purchasing a truck for the delivery of butter and the collecting of milk at the stations in the city.

Prof. H. R. Duncan, Assistant in Dairying at the University, resigns his position on June 15th in order to devote his attention more fully to his 500-acre farm near Maryville. Mr. Elmer Wylie, B. S., Ohio University, 1915, and M. S., Mo., 1916, has been appointed to succeed Mr. Duncan. During the past year Mr. Wylie has been doing fellowship work at the University of Missouri, the fellowship having been given as a result of student stock judging work done at the International Dairy Show.

The U. T. Circus, which was held on the night of May 13, was a grand success. The Agricultural Club won first prize on their animals, which were a cow and calf. The cow showed evidence of being a great producer, milk being extracted by the simple upward and downward propelling of the tail.

Mr. C. M. Haenseler, B. S. A., University of Tenn., 1914, and M. S. A., 1916, leaves July 1st to accept a fellowship at Rutgers. Mr. Haenseler's work will be along scientific lines. His major work here was in plant pathology.

Mr. Wm. A. Schoenfeldt, Specialist in Marketing and Rural Organization of Tennessee, was in Humboldt during the month of May collecting and receiving telegraphic information in regards to prices and markets for strawberries. This information was distributed to the farmers of that section. The distribution point for East Tennessee is Chattanooga. The last acreage yield report places Tennessee first among the strawberry states of the union.

Mr. G. W. Tobey, Specialist in Cheese Manufacturing, was in the mountain counties during the month of May assisting in the establishing of cheese factories in order to use up surplus milk and increase profits.

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EDITORIAL

The recent East Tennessee Farmers' Convention was an unparalleled success and the farmers are to be commended for the enthusiasm and the indication of progress which featured the meeting. Some of the actions and resolutions of this convention indicate an awakening in this section of the state such as is not found in many southern states. The people of East Tennessee can never get out of the mountains; but they are getting out of the "sticks" pretty fast, as may be judged by some of the things done at Temple Hall May 16-18.

A live stock association was formed for the benefit of the breeders of pure-bred cattle, horses, hogs and sheep. Resolutions were adopted requesting the legislature to enact a law requiring the teaching of agricultural biology and of scientific agriculture in every rural school in Tennessee. The convention also went on record as favoring a more liberal appropriation for the University of Tennessee, a new state constitution, the adoption of the Torrens system of land title registration, and a new building for the home-makers' section of the East Tennessee Farmers' Convention and Institute. These are all progressive measures and the sentiment back of them shows a desire for better agricultural days in Tennessee.

The farmers want, and will have, more pure-bred live stock; and better educated children as well. These resolutions call for a change in conditions that will give us boys and girls on the farm who are educated in terms of their environment, acquiring a knowledge of the many interesting and important things in the world about them. Certainly in the rural school a knowledge of agricultural biology is of more value to the boy or girl

than is a knowledge of algebra, and it is more important that the farmer boy should learn of trees and birds and animals than that he should know the details of European geography.

That the University of Tennessee is in urgent need of a more liberal appropriation from the state is not questioned by those who know the existing conditions. The convention passed a resolution stating that, "We cannot afford as a state to be stingy in dealing with the highest educational institution in the state," and urging their members to call upon their respective legislators to support such measures as may supply this need. This is a highly commendable action and when influential farmers in other sections of the state voice their sentiment, then our legislature will vote adequate funds for the improvement and maintenance of our state university.

Of especial importance is the resolution favoring the adoption of the Torrens land title system. The importance of this and something of the nature and operation of the Torrens system have been noted in a separate article elsewhere in this issue. Unquestionably our antiquated state constitution is inadequate for present day needs and it is gratifying to note that the farmers of East Tennessee are in favor of adopting a new one.

These and other things done at the recent convention show that farmers in this section of the state are wide awake and alive, with a realization of their needs and opportunities and with a desire and determination to improve East Tennessee and to place the state where she belongs on the agricultural map of the United States.

Farmers should make greater use than they now do of the information furnished by the U. S. Department of Agriculture and the state departments in the form of bulletins and leaflets. Many questions which confront the farmer have already been carefully gone over by the government. We must make use of all the accumulated agricultural knowledge that is available. If it had not been for the experience of others we would still be plowing with forked sticks. We are not yet near the top of the ladder of agricultural progress and the only way we can reach it is to start where others have left off. Beginning at the ground is all right, where it is necessary, but in agriculture start at the highest round you can reach and go up.

From the present indications it seems that the outbreak of pear blight this year will be more severe and destructive than usual. On account of the nature of the disease spraying is of no help and careful pruning of the diseased branches has so far been the only method found of checking its spread. Experiments are now being made at the fruit farm with the view of finding blight resistant varieties of pears. Over a year ago a barrel of pear seeds was imported from France and planted in nursery rows. Very few of the seeds germinated last year but

this year there is a good stand. Each seedling will be inoculated with the blight in the hope of finding one that is resistant. If such a seedling is found it will be used as a foundation from which to develop a resistant variety. A pear that is immune from blight would mean much to the fruit raising industry of the state and nation.

F. W. C.

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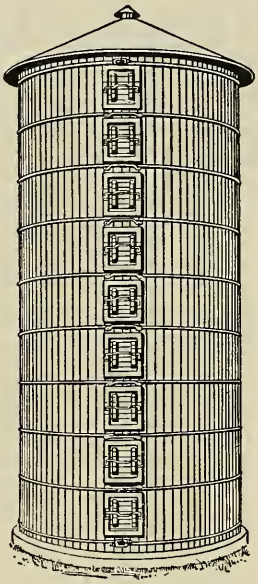

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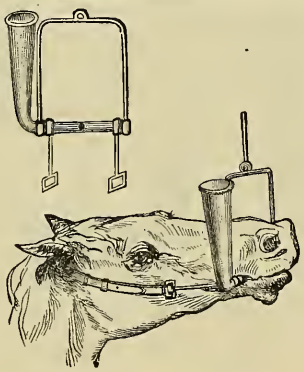

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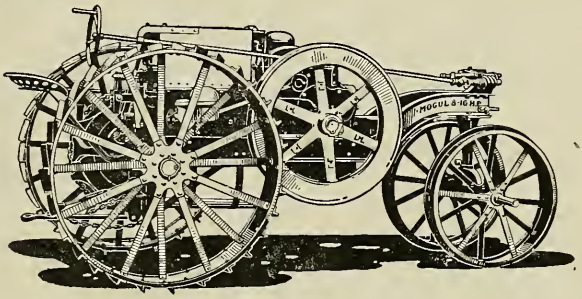

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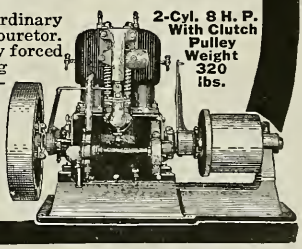

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Columbia Ground Limestone meets all such requirements, and is a sure, dependable and cheap means of supplying Potash to your farm.

PAY APPROXIMATELY $1.75 A TON FOR COLUMBIA CROUND LIMESTONE

Columbia Ground Limestone corrects the acidity of the soil, aids in breaking down the potassium compounds and sets free for plant use the indispensable Potash, that otherwise would cost you $250.00 a ton.

The salvation of the cotton crop lies in an immediate provision for Potash, without which your crop will hardly score 50 per cent of the normal. Here is your chance to make a full crop with the largest measure of profit in your experience, by using Columbia Ground Limestone.

Professor J. F. Duggar, of the Alabama Polytechnic Institute, Auburn, Ala., says: "For Cotton, Corn, Cowpeas, and most crops of the South, Lime (such as Columbia Ground Limestone) will increase the yield from 23 to 47 per cent."

On Orchard Lands, Columbia Ground Limestone will show a growth of Trees in two years that, without the use of Columbia Ground Limestone, requires three years to produce. Think of it! One year of time saved, one year of labor saved, one year of anxiety done away with completely, by the aid of Columbia Ground Limestone.

All authorities agree that Columbia Ground Limestone is an essential plant food, and in addition serves to unlock and make available the other plant foods inherent in the soil.

Columbia Ground Limestone increases the activity of the soil to an extraordinary extent and inhances the value of any commercial fertilizer that the soil may require; makes possible the growth of legumes generally and thus enriches the soil from the nitrogen obtained from the air; and aids in the rapid decomposition of all organic matter, and immediately increases the value of barnyard fertilizer.

Circular No. 149, Agricultural Experiment Station of University of Illinois, Urbana, Ill., backs and supports every one of these statements, that now, in the face of the Potash situation, are of real and prime importance to every farmer or orchardist receiving this sound business advice.

Remember, you are after Potash, the absolute requisite for large and successful crops. Obtain your Potash without cost by using Columbia Ground Limestone, the direct functions of which, alone, return its cost many times over, leaving you the released and available Potash as a by-product, FREE.

You can thus see why we ask you to think sanely, and to save the money that can be put into improvements and other practical purposes, increasing the value of your farm and furnishing you with many desirable comforts.

WRITE US TODAY

Do not delay in asking the price of Columbia Ground Limestone, delivered to your station. We will promptly advise you of the price requested, and at the same time send you, without charge, a copy of our pamplet on the easy construction of a Home-made Limestone Spreader.

COLUMBIA QUARRY CO.

General Offices: Fullerton Building

ST. LOUIS, MISSOURI